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MILITARY HANDBOOK

BACHELOR HOUSING



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ABSTRACT

This handbook is intended to promote a better understanding of bachelor housing standards and design criteria. The quality achieved in Department of the Navy facilities projects can be observed through its appearance, ambiance, and fulfillment of functional standards and mission objectives. Quality is derived from a professional commitment by users, planners, programmers, and designers to achieve understated excellence through the delivery of complete and usable facilities. To achieve quality results, the proposed bachelor housing should satisfy the design intent, be easily maintained, and present a positive image of the Navy in its caretaker role of personnel as well as the environment. This handbook is presented for the use of public works officers, community planners, housing managers, major claimants and installation staffs (funding agencies), Engineering Field Divisions (EFDs), Engineering Field Activities (EFAs), architects, engineers, contractors, landscape architects, and interior designers.

FOREWORD

This handbook uses, to the maximum extent feasible, national and institute standards in accordance with Naval Facilities Engineering Command (NAVFACENGCOM) policy. Do not deviate from this handbook for NAVFACENGCOM projects without prior approval of NAVFACENGCOM Code 15C.

Recommendations for improvement are encouraged from within the Navy, Marine Corps, and other Government agencies, and the private sector; and should be furnished on DD Form 1426 provided inside the back cover to Commander, NAVFACENGCOM Code 15C, 1510 Gilbert Street, Norfolk, VA 23511-2699; telephone commercial (757) 322-4212, facsimile machine (757) 322-4416.

DO NOT USE THIS HANDBOOK AS A REFERENCE IN A PROCUREMENT DOCUMENT FOR FACILITIES CONSTRUCTION. IT IS TO BE USED IN THE PURCHASE AND PREPARATION OF FACILITIES PLANNING AND ENGINEERING STUDIES AND DESIGN DOCUMENTS USED FOR THE PROCUREMENT OF FACILITIES CONSTRUCTION (SCOPE, BASIS OF DESIGN, TECHNICAL STANDARDS, PLANS, SPECIFICATIONS, COST ESTIMATES, REQUEST FOR PROPOSALS, AND INVITATION FOR BIDS). DO NOT REFERENCE IT IN MILITARY OR FEDERAL SPECIFICATIONS OR OTHER PROCUREMENT DOCUMENTS.



**THE SECRETARY OF DEFENSE
WASHINGTON, DC 20301-1000**

6 NOV 1995

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS

SUBJECT: Design and Construction of Unaccompanied Enlisted
Personnel Housing (UEPH)

Under Title 10 USC, Section 2856, the Secretary of Defense is required to establish the maximum allowable area per occupant for new, permanent, barracks construction. This memorandum complies with that requirement and establishes a new standard design criterion for future permanent party UEPH construction. The new standard does not apply to housing constructed for transients, recruits, or members receiving entry-level skill training. The standard is optional for barracks outside CONUS funded by other than the United States or constrained by site conditions, and for barracks to house other than full-time active duty Service members.

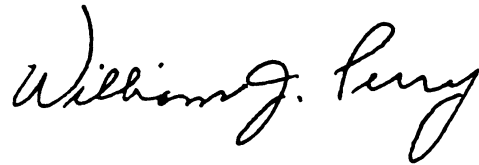
New construction (and rehabilitation where feasible) of UEPH will be based on a module consisting of two individual living/sleeping rooms with closets and a shared bath and service area. The module will contain a maximum of 47 sq. m. of gross area, measured from the center lines of all enclosing interior walls and to the outside face of exterior walls. Designs should be developed to produce 11 sq. m. of net living area per living/sleeping room, measured from the inside face of the walls to include all clear floor areas.

The maximum overall gross UEPH area, including all modules and support spaces, will be 66 sq. m. per module. To accommodate specific mission requirements, the Department of the Army is entitled to an additional overall gross UEPH area of 2 sq. m. per module. Up to 4 sq. m. per module may be added to the 66 sq. m. overall gross UEPH area for high-rise facilities (over three stories) or to meet other site-specific requirements.

This standard should be implemented as soon as practical, taking into consideration UEPH projects are at various stages of design and construction. The standard may be waived by the Secretary of a Military Department under the following circumstances:

wherever the Secretary determines that unique mission requirements or operational commitments are better served by congregate living (possible examples: Seal Teams, Force Reconnaissance Marines, Special Forces)
wherever the Secretary determines that the collective quality of life for members of a Service would be more enhanced by constructing to a lesser standard but providing new quarters to a larger number of members

Existing UEPH will not be considered inadequate for assignment because of these new criteria. But I recognize that their announcement represents a commitment to upgrading the level of privacy provided to each Service member as our resources and ingenuity permit. I challenge each Service to implement the new standard as part of an integrated UEPH plan which considers optimal use of existing, adequate quarters, renovation of those which can be made adequate, traditional military construction, and innovative use of private sector solutions.

A handwritten signature in black ink, reading "William J. Perry". The signature is written in a cursive, flowing style with a large initial 'W' and a long, sweeping tail on the 'y'.

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Section 1: INTRODUCTION

1.1 Scope. This military handbook, MIL-HDBK-1036A, provides the basic design criteria for Navy and Marine Corps bachelor housing. It presents guidance for development of designs for bachelor housing, enlisted and officer, taking into account local program operations and requirements, as well as the new Office of the Secretary of Defense (OSD) Construction Standards. Refer to the Secretary of Defense Memorandum, dated 6 November 1995, in the front of this handbook, before the table of contents.

1.1.1 Purpose. This handbook is applicable to projects in the Continental United States, (CONUS), and Outside the Continental United States (OCONUS). It applies to new facilities and renovation projects. It provides information needed to produce a design for a specific project. Use this handbook in conjunction with Department of Defense (DOD) and other Department of Navy criteria that give related guidance. This handbook is not a substitute for programming research by the designers, and it recognizes that local climates, geography, communities, mission needs, and changing programs necessitate some special requirements for bachelor housing. It follows consensus tri-service norms for area per occupant that are within the DOD established maximums for construction. It also establishes the minimum design standards for size and quality. Designers are encouraged to exceed these standards where appropriate. It provides criteria for determining:

- a) Site evaluation and planning
- b) Landscape design
- c) Facility design
- d) Interior design

1.1.2 Cancellation. This handbook, MIL-HDBK-1036A, dated 8 August, 1997, cancels and supersedes MIL-HDBK-1036, dated 5 May 1995.

1.1.3 Related Criteria. Unique design requirements of a specific project are addressed individually by respective subject and/or engineering discipline design guidance.

1.1.4 Design Build. A design/build strategy is now preferred for acquisition of bachelor housing. With design/build, the contractor forges a single contract with the owner to provide design and construction services. There are several variations of design build strategies.

a) RFP (Request for Proposal). The RFP method involves use of a performance specification to obtain a technical proposal for design and construction of a project with award going to the best design without primary reference to price; therefore, "best value." The RFP method is generally preferred for renovations.

b) IFB (Invitation for Bids). The IFB method involves use of a performance specification to obtain a lowest price bid and award made to a qualified contractor.

1.2 Project Initiation (Planning). This handbook provides information required for preparation of DD Form 1391's, title, which initiate project development. This includes information about functions, space allowances, overall building size, site evaluation, and special factors to consider in developing overall scope and cost estimates. It provides data and criteria needed at each stage of NAVFACENGCOM planning, project engineering, and the design process; and interfaces with the Navy Department's planning, programming, and budget system. Additional documentation may be provided in accordance with Chief of Naval Operations (CNO) or Commandant of the Marine Corps (CMC) guidance.

1.2.1 Site Selection. Site selection is a key aspect of the initial project work and requires thoughtful consideration. This is generally part of a comprehensive planning process, and must be completed prior to submission of a military construction project. After a site is selected, the project approved, and a designer is on board, thorough site and field investigations are performed.

1.2.2 Project Engineering Phase. The next stage after a project is initiated is analyzing and defining the project. During the project analysis stage, the project team meets to define the project to have a clear understanding of the project goals and objectives. The customer, major claimant, design agent, and architect/engineer (A/E) team then develops project requirements based on an analysis of unique needs and requirements of the customer, established criteria, and site and environmental constraints. Information gathered provides the

basis for defining the preliminary design. This information is intended to support the project engineering phase and the parametric cost estimating and programming (PCE) process. This includes space planning, site design, selection of the appropriate apartment module, building design, and building elements and concepts found in this handbook. Unique local requirements concerning building program and design criteria are included in the PCE. Physical security requirements for facilities are also to be established and included in the design program.

1.2.3 Conceptual Design. (Approximately 15 percent design completion.) Once the project requirements are understood, preliminary specifications (basis of design), and cost data serve to set the minimum acceptable quality for the project. A key to the success of the conceptual design is the use of the customer focused on-site workshop where the customer (bachelor housing management staff, public works staff, activity planners, and end users as appropriate), design agent, and designers develop and agree to the concept for the project. They also define and choose an appropriate acquisition strategy. Ensure project designs conform to the overall project design considerations described in Sections 3 and 4.

1.3 Assignment Standards. The assignment composition for a project establishes the apartment module type used to compose the design of the building. For example: New Navy construction programmed for "permanent party" use would adopt the (1+1) apartment module as its basic design element.

a) The assignment standards for Navy personnel are described in OPNAVINST 11103.1, Policies and Procedures Governing Bachelor Housing. Also refer to DOD Manual 4165.63-M, DOD Housing Management Manual.

b) The assignment standards for Marine personnel are described in Marine Corps Order (MCO) P11000.22, Facilities Projects Manual.

1.3.1 Permanent Party Construction for New Construction and Renovations. The criteria described in this handbook is written specifically for new and replacement construction, and may not be altered without official waiver. The Secretary of Defense Memorandum dated 6 November 1995 applies to new construction (and rehabilitation where feasible). Designs must meet or exceed the standard for permanent use as follows:

a) The Navy uses a (1+1) apartment module for permanent party bachelor housing.

b) The Marines use a (2+0) dormitory module for its new permanent party construction. The Marines will use the (1+1) only with Headquarters, U.S. Marine Corps (HQMC) approval.

c) Special short term training assignments require the use of open bay configurations. Examples include: recruit and special situations as approved by HQMC.

1.3.2 Transient Party Construction of New Construction and Renovations. The criteria described in this handbook is also written specifically for new and replacement construction of transient facilities. The Secretary of Defense Memorandum dated 6 November 1995 applies to rehabilitation where feasible.

a) The Navy uses a (2+2) dormitory module for its transient construction, and for certain renovations.

b) The Marines use the (2+2) for transients and military occupational specialty (MOS) training.

c) Special short term training assignments require the use of open bay configurations. Examples include: recruit and special situations as approved by HQMC.

1.3.3 Repairs of Existing Facilities. Repairs of existing facilities originally designed for current assignment standards are permitted. Refer to par. 2.7 for additional guidance. Coordinate repair, special projects, and construction with public works programming guidance in accordance with OPNAVINST 11010.20, Facilities Projects Manual, or MCO P11000.7.

Section 2: PLANNING

2.1 General. The Secretary of Defense has directed the implementation of a new standard size for bachelor housing apartment modules. A copy of the Secretary of Defense Memorandum dated 6 November 1995 is included in this handbook. The new (1+1) apartment module size will be used for all Navy bachelor housing except for authorized exceptions and recruit barracks. Use of the 1983 (2+2) apartment module size for new construction requires Secretary of the Navy approval. The Marines will use the (2+0) apartment module size for new construction.

2.2 Facility Functions. Address the following basic functional activities in bachelor housing. These three basic functional areas are interactive, and designers must fully understand these relationships, and take a holistic approach to creating a fully integrated facility. The three basic functional categories are:

a) Residential apartment (the standard module): bedroom/living room, personal hygiene, work/study desk area in the bedroom, personal storage closet, indoor relaxation.

b) Recreation and community: outdoor sports, outdoor relaxation areas (these include individual and group activities), pre-installed/built-in phone and cable television outlets in each room.

c) Service (core): Laundry facilities, bulk storage, utility space, mail service area, circulation space, multipurpose space, game room, vending area, guest toilets, supply storage room, administration area.

2.3 Planning Considerations. Consider the following items when planning the facility space program:

a) The current and projected resident population served by the proposed facility.

b) The potential for retention and renovation of existing facilities.

c) The need for additions and complete new construction projects.

d) Existing community facilities on base and their adequacies relative to current and future needs.

e) Locate bachelor housing within walking distance of community facilities, such as dining facilities. Programmers should address the capacity of existing community facilities and accommodate any additional requirements incurred by the proposed bachelor housing increase.

f) Capacity of existing bachelor housing using assignment standards discussed below.

g) Physical security of personnel and property.

2.4 Existing Construction Modernization Standards. Net living area of a room is measured from the inside face of the peripheral wall and includes all such enclosed space and partitions.

2.5 Navy New Construction Standards. See Table 1. The criteria standards for new construction for bachelor enlisted and bachelor officers includes the following design configuration types:

a) (1+1) apartment module plans for permanent party (Figures 1, 2, and 3).

b) (2+2). The Navy will use the (2+2) apartment type for transients (Figures 4, 5, and 6). Transients include:

(1) "A" school students, deployed rotational units, and ships crews in a commissioning, decommissioning, or overhaul status.

(2) Students attending school less than 20 weeks.

(3) Reserves on active duty training (ACTDUTRA).

(4) Temporary duty (TDY) personnel.

c) Open bay (Figure 8) design configurations are to include:

(1) Recruits

(2) Special forces with special mission needs (example: Navy seal teams and special forces).

d) The Navy occasionally houses in accordance with OPNAVINST 11103.1, but does not build for:

- (1) Shipboard sailors
- (2) Geographic bachelors
- (3) Civilians.

2.6 Marine Corps New Construction Standards. See Table 1. The new construction criteria standards for bachelor enlisted and bachelor officers includes the following design configuration types:

a) (1+1) apartment module for permanent party only where specified (Figures 1, 2, and 3).

b) (2+0) apartment module for permanent party (Figure 7).

c) (2+2) module for transients.

d) Open bay design configurations (Figure 8) are to include:

(1) Recruits

(2) Special forces with special mission needs (example: force reconnaissance Marines and special forces).

d) The Marine Corps occasionally houses, but does not build for:

(1) Geographic bachelors

(2) Civilians.

2.7 General Apartment Access. This handbook refers to three general types of apartment access: garden style, exterior corridor, and interior corridor. (1+1) (see Figures 1, 2, and 3) construction uses all three. (2+2) (see Figures 3 and 4) and (2+0) (see Figure 7) construction use exterior or interior access only. The apartment modules shown are like basic building blocks from which bachelor housing programs are developed. The typical layouts, are not mandatory standards, but are provided as examples. The module layout may vary if the minimum net living area, minimum dimensional clearances, and maximum gross building area conform to the overall limits. Limited space in the module total requires that variations above the minimums be small.

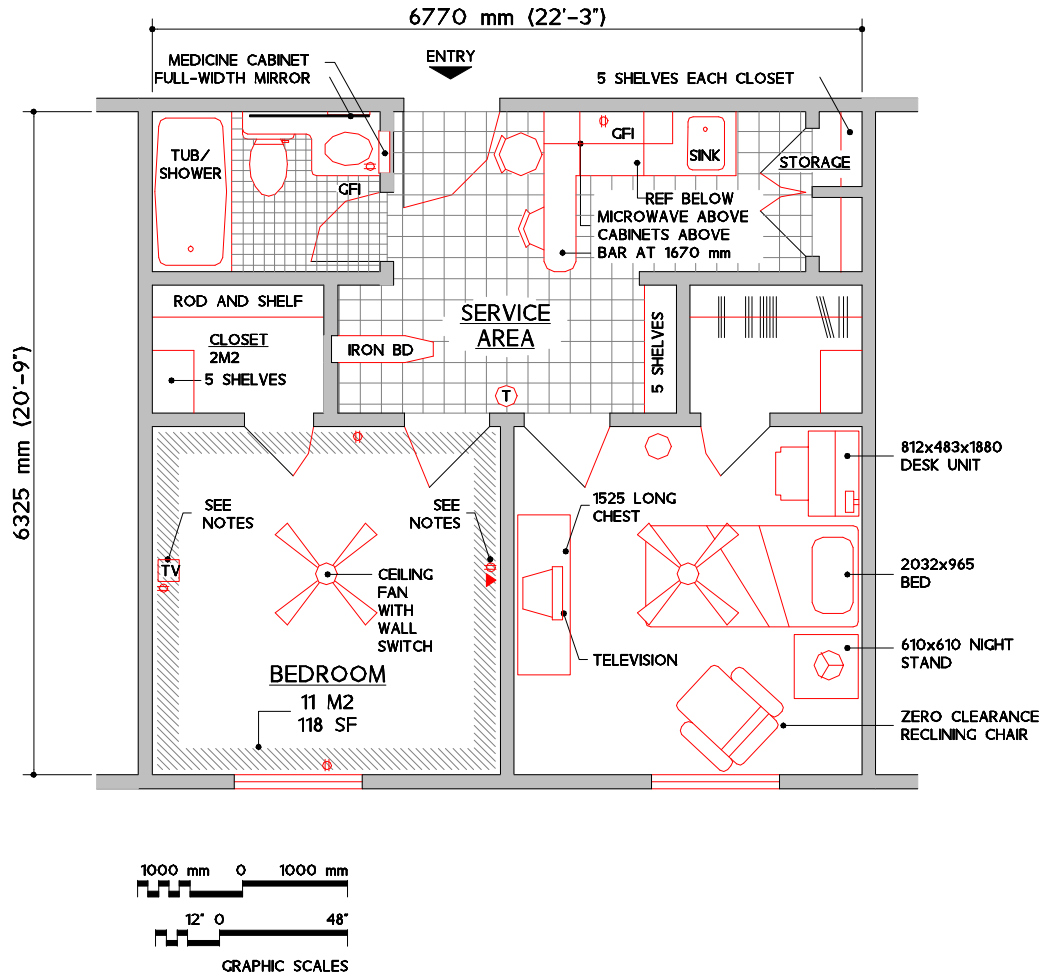
2.7.1 Net Living Area

a) Net living area is measured from the inside face of wall to inside face of the opposing wall. Door swing areas and mechanical unit areas which specifically serve the room are included in net calculations.

b) Areas excluded from net living area calculations are areas not privately controlled by a resident, shapes furred to hide through-the-wall equipment or used for storage not specific to the apartment; furred-out columns, pilaster, and mechanical or plumbing chases that extend into the living and bedroom area from the wall plane, if such items extend from floor to ceiling; and bulk storage not accessible from within the apartment.

c) Countless configurations are possible in the design of typical modules, and improvements are encouraged. It is impossible to describe all configurations in this handbook. The method of measuring net living area for intricate designs may require interpretation by EFD or EFA staff. Refer to DOD 4165.63-M or more information on net living area calculations.

2.7.2 Gross Module Area. Gross module area is defined as the area within the walls comprising the perimeter of an apartment module. Wall thickness and chase areas within the perimeter walls are included. Gross module area is measured from the centerline of perimeter walls shared with interior corridors, common chases, or other rooms. It is measured to the outside face of exterior walls. Corner rooms with two exterior walls should have the same interior dimensions as other rooms even though, technically, the gross module area for these corner rooms is slightly more than for other rooms.



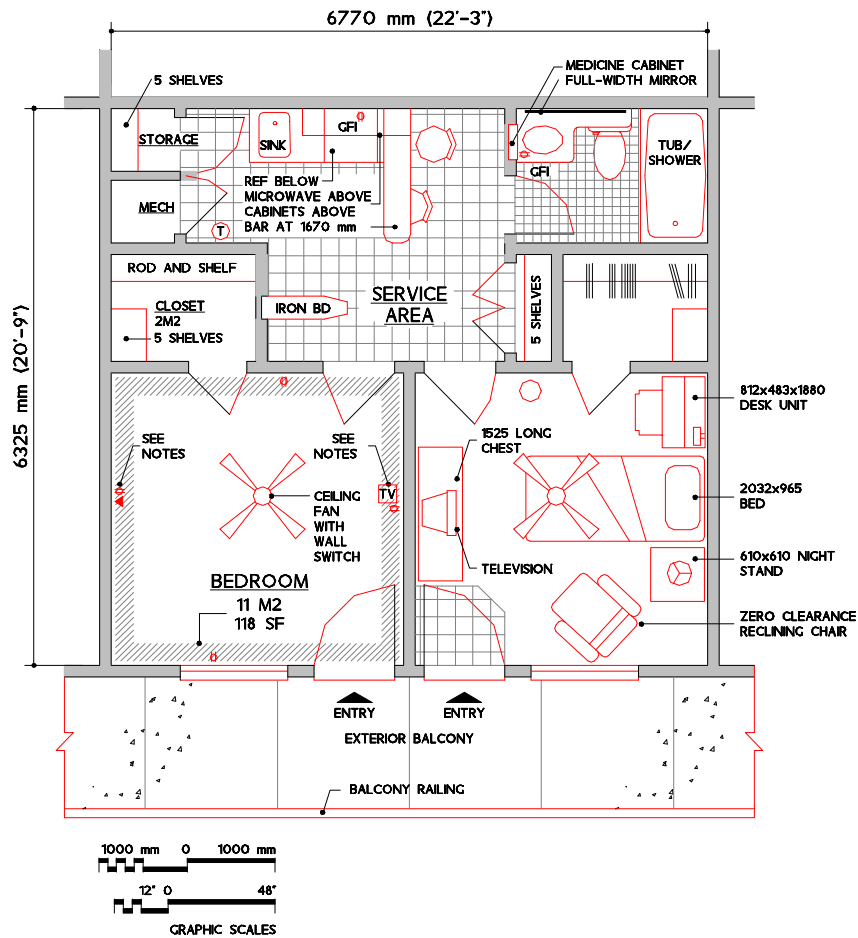
1 + 1 MODULE, INTERIOR ACCESS

Requirement	Criteria	Illustration
Building Gross Area Per Module	66 SQM maximum (70 High-Rise)	
Gross Area Per Module	46 SQM	46 SQM
Net Sleeping Area	11 SQM/Person	11 SQM
Navy Personnel, Grades E1-E4	2 Persons Per Module	2 Persons Per Module
Navy Personnel, Grades E5-E9	1 Person Per Module	Change 1 B/R to Living

Notes

- At bed headwall, provide a ganged outlet containing 3 electrical outlets and 1 telephone modular jack.
- At wall opposite bed, provide ganged outlet containing 3 electrical outlets and 1 television/LAN outlet.
- Locate HVAC control in common area of module.

Figure 1
(1+1) Module (Interior Access)



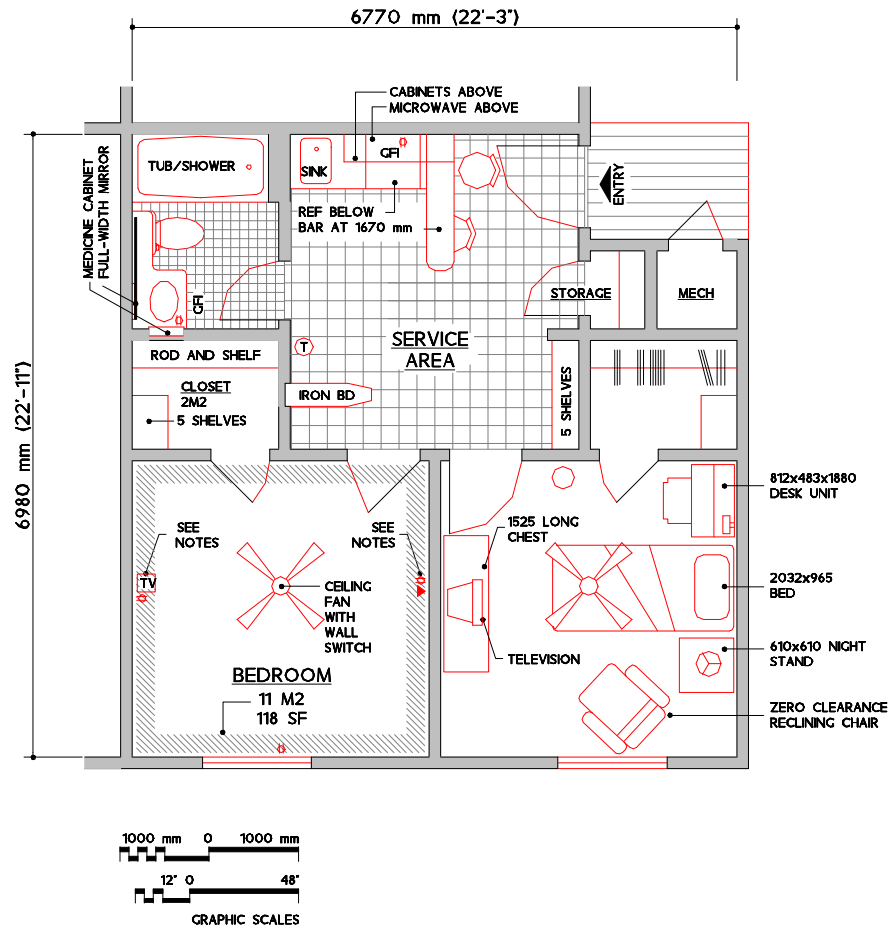
1 + 1 MODULE, EXTERIOR ACCESS

Requirement	Criteria	Illustration
Building Gross Area Per Module	66 SQM maximum (70 High-Rise)	
Gross Area Per Module	46 SQM	46 SQM
Net Sleeping Area	11 SQM/Person	11 SQM
Navy Personnel, Grades E1-E4	2 Persons Per Module	2 Persons Per Module
Navy Personnel, Grades E5-E9	1 Person Per Module	Change 1 B/R to Living

Notes

- At bed headwall, provide a ganged outlet containing 3 electrical outlets and 1 telephone modular jack.
- At wall opposite bed, provide ganged outlet containing 3 electrical outlets and 1 television/LAN outlet.
- Locate HVAC control in common area of module.

Figure 2
(1+1) Module (Exterior Access)



1 + 1 MODULE, LANDING ACCESS

Requirement	Criteria	Illustration
Building Gross Area Per Module	66 SQM maximum (70 High-Rise)	
Gross Area Per Module	46 SQM	46 SQM
Net Sleeping Area	11 SQM/Person	11 SQM
Navy Personnel, Grades E1-E4	2 Persons Per Module	2 Persons Per Module
Navy Personnel, Grades E5-E9	1 Person Per Module	Change 1 B/R to Living

Notes

- At bed headwall, provide a ganged outlet containing 3 electrical outlets and 1 telephone modular jack.
- At wall opposite bed, provide ganged outlet containing 3 electrical outlets and 1 television/LAN outlet.
- Locate HVAC control in common area of module.

Figure 3
(1+1) Module (Landing Access)

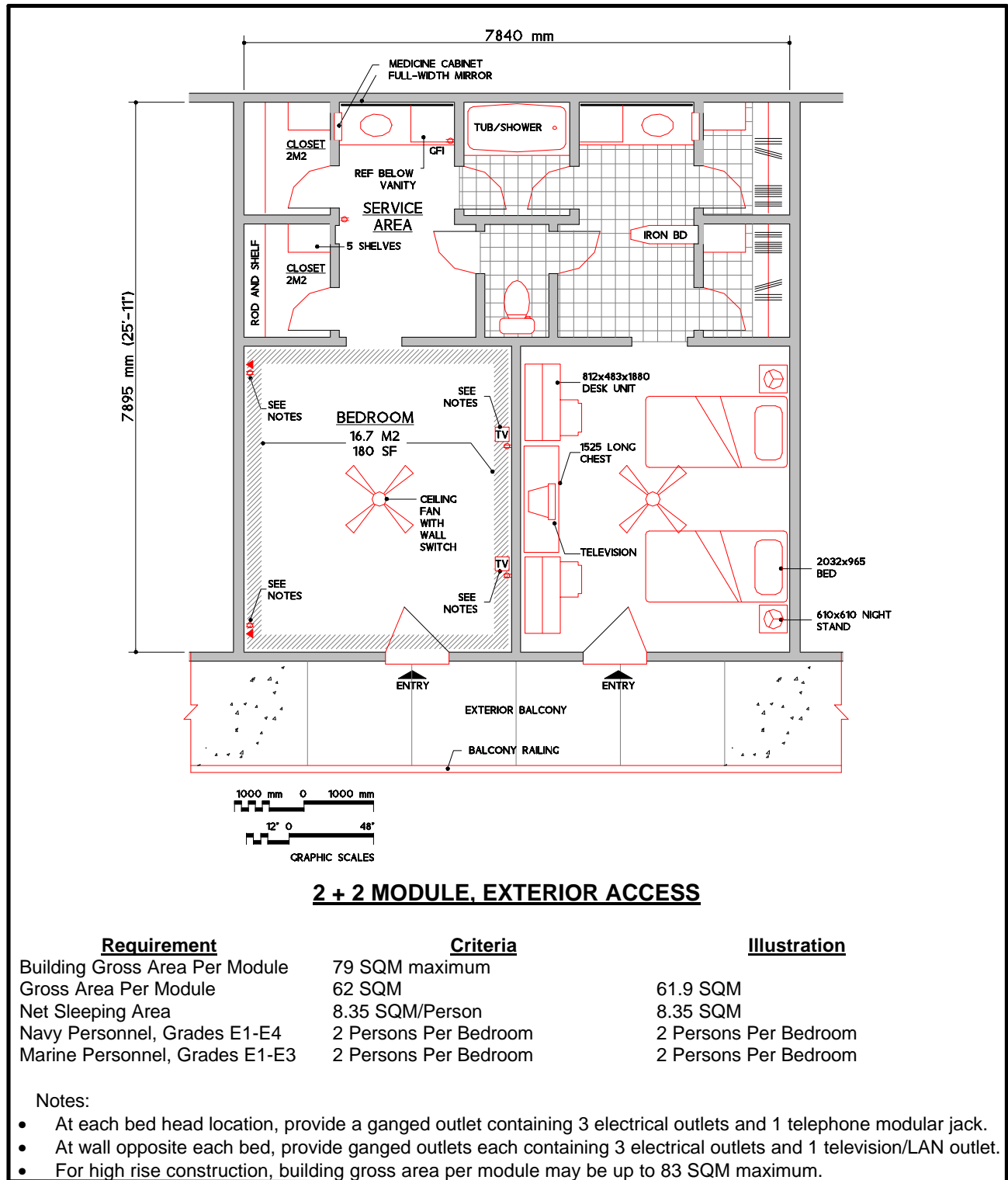
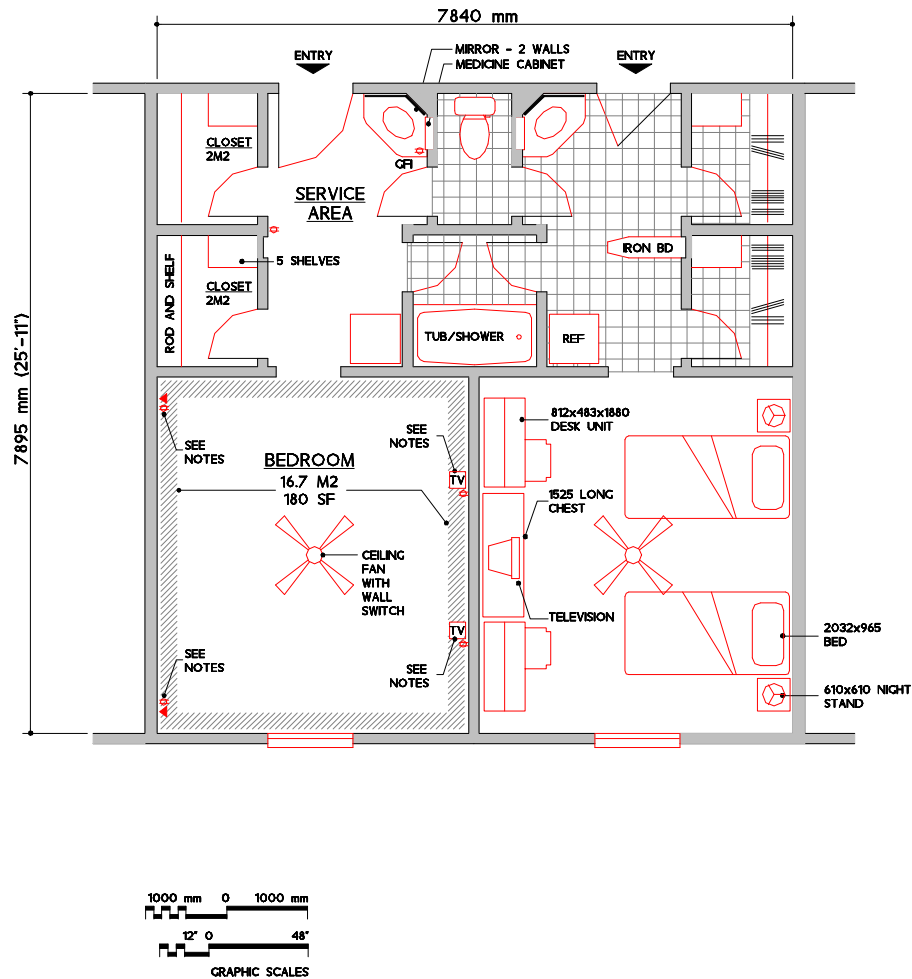


Figure 4
(2+2) Module (Exterior Access)



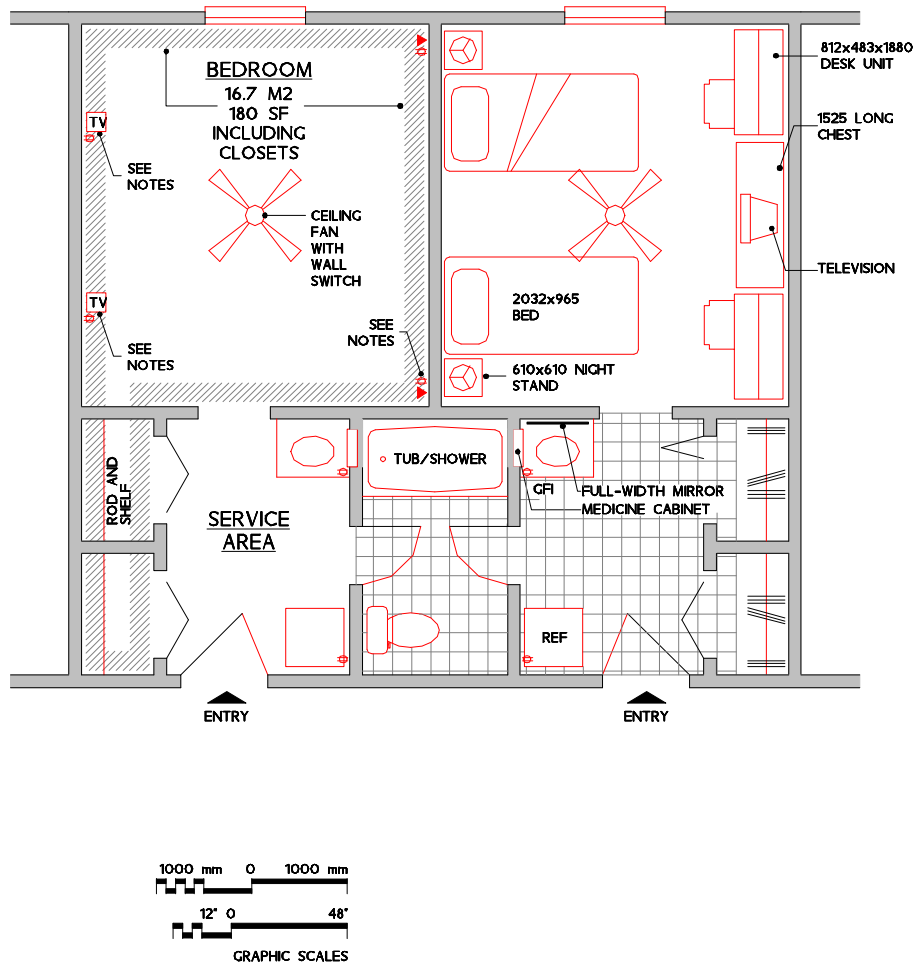
2 + 2 MODULE, INTERIOR ACCESS

Requirement	Criteria	Illustration
Building Gross Area Per Module	79 SQM maximum	
Gross Area Per Module	62 SQM	61.9 SQM
Net Sleeping Area	8.35 SQM/Person	8.35 SQM
Navy Personnel, Grades E1-E4	2 Persons Per Bedroom	2 Persons Per Bedroom
Marine Personnel, Grades E1-E3	2 Persons Per Bedroom	2 Persons Per Bedroom

Notes:

- At Each bed head, provide a ganged outlet containing 3 electrical outlets and 1 telephone modular jack.
- At wall opposite bed, provide ganged outlets each containing 3 electrical outlets and 1 television/LAN outlet.
- For high rise construction, building gross area per module may be up to 83 SQM maximum.

Figure 5
(2+2) Module (Interior Access)



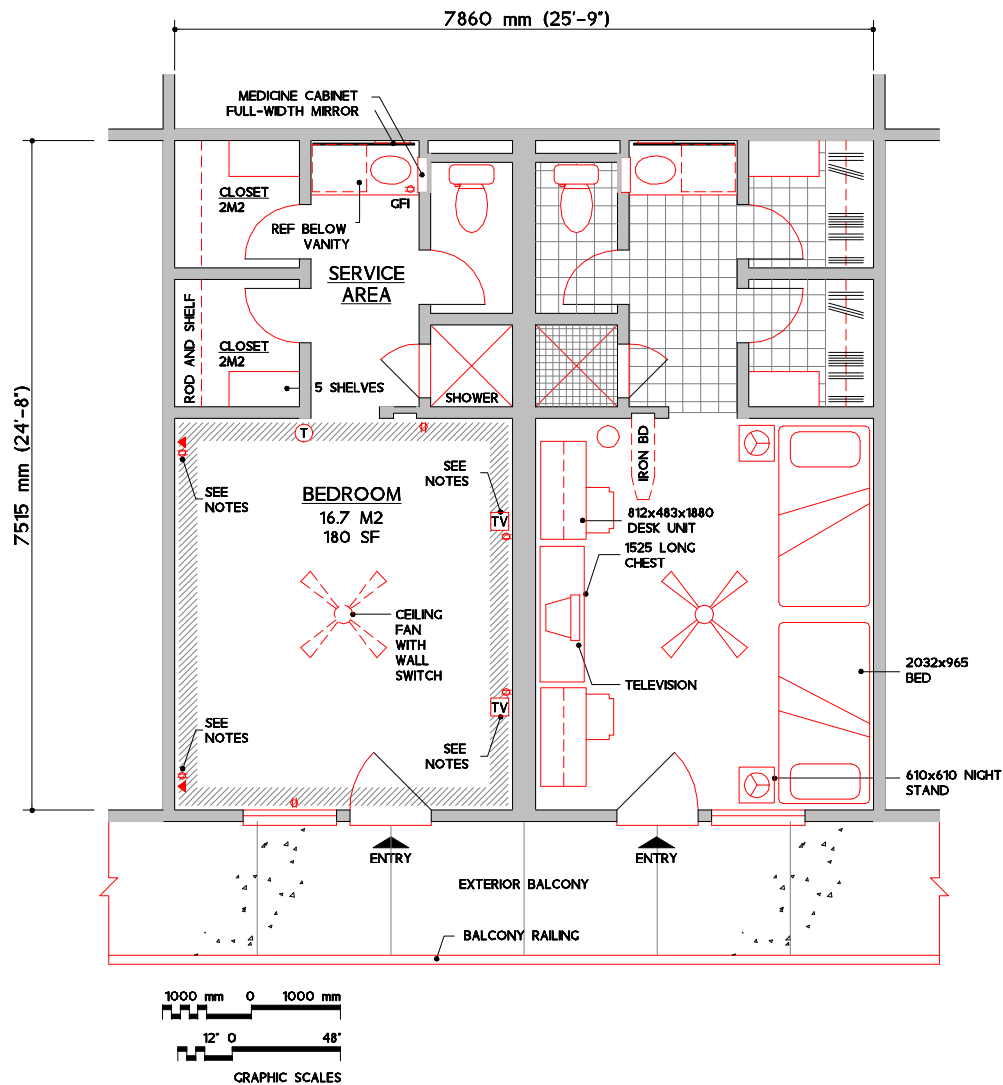
2 + 2 PLAN FOR RENOVATION OF EXISTING CONSTRUCTION

Requirements	Criteria	Illustration
Building Gross Area Per Module	79 SQM maximum	
Gross Area Per Module	46 SQM	
Net Sleeping Area	8.35 SQM/Person	8.35 SQM
Navy Personnel, Grades E1-E4	2 Persons Per Bedroom	2 Persons Per Bedroom
Navy Personnel, Grades E5-E9	1 Person Per Bedroom	Not Illustrated

Notes:

- At each bed head location, provide a ganged outlet containing 3 electrical outlets and 1 telephone modular jack
- At wall opposite each bed, provide ganged outlets each containing 3 electrical outlets and 1 television/LAN outlet.
- For high rise construction, building gross area per module may be up to 83 SQM maximum.

Figure 6
(2+2) Plan for Renovation of Existing Construction



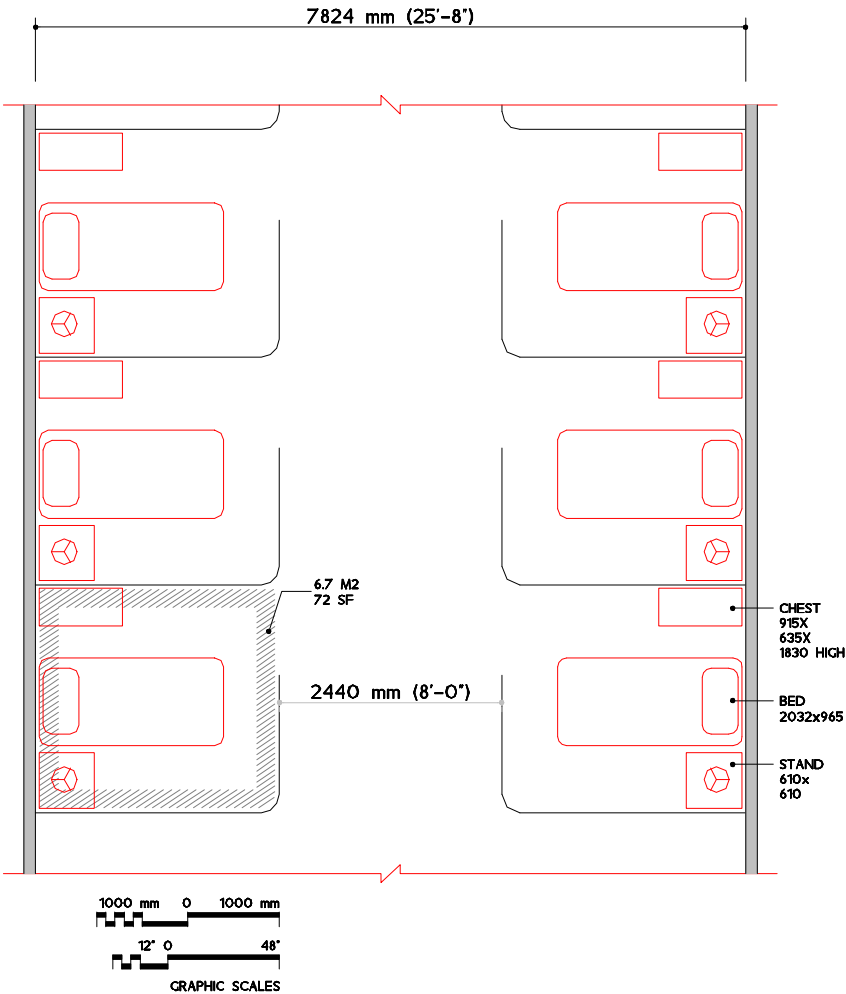
2 + 0 MODULE, EXTERIOR ACCESS
(Containing 2 Apartments)

<u>Requirement</u>	<u>Criteria</u>	<u>Illustration</u>
Building Gross Area Per Module	85 SQM	
Gross Area Per Module	59 SQM	59 SQM
Net Sleeping Area	8.35 SQM/Person	8.35 SQM
Navy Personnel, Grades E1-E4	2 Persons Per Bedroom	2 Persons Per Bedroom
Marine Personnel, Grades E1-E3	2 Persons Per Bedroom	2 Persons Per Bedroom

Notes:

- At each bed head location, provide a ganged outlet containing 3 electrical outlets and 1 telephone modular jack.
- At wall opposite each bed, provide ganged outlets each containing 3 electrical outlets and 1 television/LAN outlet

Figure 7
(2+0) Module (Exterior Access)



OPEN BAY STYLE

Requirement	Criteria	Illustration
Net Sleeping Area	7.7 SQM/Person	7.7 SQM/Person
Navy Personnel, Recruit	Open Bay Style	Open Bay Style
Marine Personnel, Recruit	Open Bay Style	Open Bay Style

Figure 8
Open Bay Style

Table 1
Construction Standards for Navy and Marines

<p>(1+1) MODULE Figure 1, 2, or 3 Gross Building Area per Module:</p> <p>Gross Module Area includes: Sleeping/living area (net 11 sq. m. per person) Service Area Bathroom Closets (net 2 sq. m. per person) Mechanical, Electrical, Communications space inside the module</p> <p>Mechanical/Electrical/Air Conditioning (for the sleeping area)</p> <p>Administration Core Areas include: (Administrative offices, reception desk, Communal Areas, vestibule, lobby, lounges, concession areas, public circulation areas.</p>	<p>66 sq. m. maximum; (See Note) 46 sq. m. (495 sq. ft.) Note: OSD standards permit a maximum size of 47 sq. m. to accommodate some less efficient floor plans needed for renovation.</p> <p>8 sq. m. (86 sq. ft.) (approximately)</p> <p>12 sq. m. (129 sq. ft.) (approximately)</p>
<p>Note: Up to 4 sq. m. per module may be added to the building gross area for structures 4 stories or higher, and specific site construction requirements.</p>	
<p>(2+2) MODULE Figure 4 or 5 Gross Building Area per Module:</p> <p>Gross Module Area includes: Sleeping/ living area (90 sq. ft per person net) Service Area Bathroom Closets (standard size; less than 2 m.)</p>	<p>79 sq. m. (3 stories or less) 83 sq. m. (maximum for 4 stories or higher)</p> <p>55 sq. m.</p>

Table 1 (Continued)
Construction Standards for Navy and Marines

Administration Core Areas include: (Administrative offices, reception desk, Communal Areas, vestibule, lobby, lounges, concession areas, public circulation areas. Mechanical/Electrical/Air Conditioning (for the sleeping area)	24 sq. m. (3 stories or less) 28 sq. m. (maximum for 4 stories or higher)
(2+0) MODULE (MARINE CORPS) Figure 7 Gross Building Area per Module: Gross Module Area includes: Sleeping/ living area (net 90 sq. ft per person - 180 per room) Service Area Bathroom Closets (standard size; less than 2 sq. m.) Administration Core Areas include: (Administrative offices, reception desk, Communal Areas, vestibule, lobby, lounges, concession areas, public circulation areas. Mechanical/Electrical/Air Conditioning	80 sq. m. (3 stories or less) 65 sq. m. 26 sq. m. (3 stories or less)
OPEN BAY Figure 8 Net living/sleeping area (per person) Building gross area (per person includes Mechanical/Electrical/Air Conditioning	6.7 sq. m. (72 sq. ft.) 13 sq. m. (140 sq. ft.)
Note: In open bay area, an 8 ft wide center corridor is included within the gross building area, but excluded from the net area.	

2.7.3 Gross Building Area. Gross building area is measured to the outside face of exterior enclosure walls. Do not include normal roof overhangs, balconies of less than 2 sq. m., and

mechanical equipment balconies in gross building area calculations. Exterior covered areas such as balconies over 2 sq. m. count as half scope, and are measured from the face of the enclosure wall to the edge of the covered area. Stairs and elevator shafts count as half scope per floor that they serve. Refer to NAVFAC P-80, Facility Planning Criteria for Navy and Marine Corps Shore Installations, for more information on scope calculation. The gross building area for bachelor housing should not exceed 66 sq. m. per apartment module except for specifically justified space for mid-rise buildings not to exceed an additional 4 sq. m. (43 sq. ft.) per apartment module. This limitation emphasizes the need to efficiently design the apartment module and to provide more area outside the modules for recreation, community, and support functions. Apartment modules with a gross area of the recommended 46 sq. m. allow 20 to 24 sq. m. (215 to 258 sq. ft.) to apply to areas outside the module (66 or 70 sq. m. minus 46 sq. m.), whereas larger apartment modules, while allowed, limit the size and potentially the quality of areas providing recreation, community, and support functions.

2.8 Site Selection

a) For the Navy. Follow the established planning process. Site selections are addressed by the base, with the Public Works Office and the bachelor housing management staff making preliminary decisions. EFDs or EFAs can provide studies and support when requested by activities. Bachelor housing managers should have a strategic plan for their bachelor housing approved by the Base Commanding Officer. Quality of life factors of importance are: development potential; proximity to existing support facilities; relationship to community facilities; existing topography; existing landscape; available base infrastructure; adjoining land uses; vehicle circulation systems; future expansion; relation to existing bachelor housing; existing walkways; and designated bike and jogging paths. Previous site selections have placed many bachelor housing in or near operations areas. Many of these sites are not good Quality of Life Neighborhoods. A simple rule of thumb for evaluating a bachelor housing site is, "Would it make a good family housing site?" If not, then it is not a good location for a bachelor quarter. Long range planning will address relocation of existing bachelor housing located in sites that cannot provide Neighborhood of Excellence Standards.

b) For the Marines. Site selection is to be in accordance with the Base Installation Master Plan.

2.9 Renovations. Preliminary investigations should address any building deficiencies or environmental issues that could affect the project. Some criteria is required by statute or higher authority policy (e.g., OMB Circular, Executive Order, DOD Directive, etc.). Incorporate this criteria in all projects: new, replacement, and renovation. Primary resources for project preparation should include adequacy. Size and condition are the two key factors used to determine adequacy. Projects should not be generated for housing currently meeting assignment size standards for the sole purpose of meeting new construction size standards. Projects generated to correct inadequate size or condition problems should follow this guide.

a) Interior Corridor Style. A common type of wholesale renovation project is to convert an existing interior corridor style with interior access to an exterior corridor style facility with exterior access. This involves replacing the gang toilets and the double-loaded interior corridors with semi-private toilets. Access to the living units is provided by new exterior balconies and exterior stairways. This concept requires some flexibility in space requirements due to existing column locations, limited building widths, small mechanical rooms, etc. Although some flexibility is allowed due to these constraints, renovation projects should comply with the authorized net living area applicable to new bachelor housing.

b) Welton-Beckett Style. Another common renovation project is to update old "Welton-Beckett" style housing. The units group four bedrooms around a central entrance, and occasionally have a problem with fire exiting requirements. With the new NFPA 101, Life Safety Code, and the availability of sprinklers, this is easily solved. Bathrooms having doors connecting separate apartments should be sealed for security. The use of housing, as well as the authorized net living area for the residents may change over time. Designers must take this into account, and design new facilities to allow easy conversion to another use, such as from permanent party to transient, to single occupancy suites.

c) Repair Projects. Use technical criteria in this handbook as guidance in developing repair projects where applicable (e.g., if a project involves remodeling kitchens, replace cabinets and appliances in accordance with the technical section of this handbook which describes cabinets).

2.10 Asbestos. A preplanning initial site investigation should identify existing asbestos probabilities affecting the project. In accordance with OPNAVINST 5100.23, Navy Occupational Safety and Health (NAVOSH) Program Manual, the Navy's objective for Asbestos Management Program Ashore is to eliminate personnel exposure to airborne asbestos fibers in occupied Navy buildings and workspaces through cost effective management of asbestos containing material (ACM). The program consists of three key elements: 1. Inventory, Survey, and Material Evaluation; 2. Operations and Maintenance; 3. Design and Abatement of Hazards. The first two elements are required for shore facilities. Facilities constructed before 1980 or targeted for renovation work should be given priority for completing the first two elements. For renovation and repair projects, the Asbestos Survey and Operation and Maintenance (O&M) Plan should be verified during initial site investigations. Positive and assumed ACM should be noted in the contract documents based on the potential for disturbance. Any project scope involving removal and/or encapsulation of ACM would incorporate the third element of the Asbestos Management Program and comply with OSHA 29 CFR 1910.1101, Asbestos. A unit schedule should be included in the contract bidding schedule to quantify ACM identified in the inventory to deter costly change orders due to hidden conditions.

2.11 Lead. A preplanning initial site investigation should identify existing surface coatings and materials that contain lead probabilities affecting the project. A lead survey should be developed to identify any lead containing material before beginning any renovations. If a lead survey is not available, consider painted surfaces in pre-1982 facilities as lead containing.

2.12 Historical. Initial planning should include the State historical representative if the building is eligible or listed as a historically significant structure.

2.13 Archaeological. A preplanning initial site investigation should include whether the affected area of construction involves earthwork in an archaeologically sensitive area.

2.14 Seismic. A seismic study in Seismic Zones 1 to 4 will be required for renovation projects in accordance Executive Order HDN/95-001, dated 10 January 1995 to determine if structural upgrades are required.

2.15 Mockups. Refer to Section 5 for additional descriptions of mockups.

a) The use of mockups is desirable for bachelor housing new construction projects, and renovations projects which contain more than 10 repetitive apartment plans .

b) Mockups are created and finished for illustration purposes, and for this reason are most successful when completed prior to the start of project construction.

c) For new construction, mockups may be elemental or whole, built off-site and later dismantled or built on-site and converted for actual use.

d) For renovations, mockups should be constructed in place on-site and converted to actual use to be most cost effective.

2.16 Radon. Check EPA document EPA's Map of Radon Zones, (by state), September 1993, EPA 402-R-93-XXX, to determine the radon priority area. Also, check the results of the Navy radon survey by contacting the NAVFACENGCOM EFD or EFA Air Pollution Engineer.

a) Contaminants. Evaluate the site for potential soil and groundwater contamination. Check with the environmental Installation Restoration Program, and the Underground Storage Tank Program. Also, check previous uses of the site.

b) Mitigation. Provide passive sub-slab depressurization systems for projects located in the Priority Area No. 1 (predicted average radon level greater than 4 pCi/L). The system should be changed to active if needed based on follow-up testing. Check EPA document Model Standards and Techniques for Control of Radon in New Residential Buildings, Federal Register 59 FR 13402 dated 21 March 1994.

2.17 Physical Security. The DOD objective is to limit property damage, and eliminate personnel exposure to security threats in occupied Navy buildings and workspaces through cost effective security improvements. DOD policy for antiterrorism protection of facilities is contained in DOD Directive 2000.12, Protection of DOD Personnel and Resources Against Terrorist Acts, dated 15 Sept. 96, and DOD Combating Terrorism Program, and the DOD Handbook 2000.12H, Protection of Personnel and Activities Against Acts of Terrorism and Political Turbulence, dated

February 1993, and OPNAVINST 5530.14B, Department of the Navy Physical Security and Loss Prevention. These requirements are applicable for new construction and renovation of existing facilities.

The DOD Commander must conduct a risk evaluation to establish design basis threat for the facility. The risk evaluation examines the proposed project based upon the following considerations:

a) Facility siting and location which provide a clear zone safe distance between the facility and the perimeter fence to mitigate potential effects of explosive threats in accordance with the design basis threat established by the customer.

b) A layered system of barriers to delay terrorist intruders, provide physical and psychological boundaries which establish perimeter boundary control, exterior security control, and building level security systems to protect personnel and to comply with quality of life standards.

c) Control of vehicle access and egress from the facility using traffic signs. Designation of separate entrances for deliveries, visitors, and resident vehicles.

d) Control of pedestrian access to entrances and exits. Use of an emergency egress annunciation system. Provision of security lighting systems for the facility perimeter and parking areas.

e) Avoid multi-story high rise construction (more than three stories) unless real estate constrained. Consider a memorandum of understanding or real estate acquisition as an alternate to high rise construction. Limit vehicle access underneath and physically adjacent to facilities while maintaining pedestrian access.

f) Exterior explosive attacks. Facilities where design basis threat includes explosive attacks should avoid facing major building surfaces (facades) directly or broadly onto adjacent roads, parking, or vulnerable areas. Minimize windows and other openings (fenestration) in exterior facades. Consider security glazing of windows. Design to prevent progressive collapse of the building. Arrange single-loaded rooms to overlook a protected courtyard. Focus primary windows and openings onto protected, less vulnerable areas. Detailed

selection, analysis, and cost criteria are provided in MIL-HDBK-1013/12, Evaluation and Selection Analysis of Security Glazing for Protection Against Ballistic, Bomb, and Forced Entry Tactics.

Section 3: FUNCTIONAL AREA AND SPACE CRITERIA

3.1 General. Bachelor housing are a residential complex of homes. The quality benchmark is a mid-level multi-family apartment complex.

3.2 Basic Apartment Module Plans. Apartment module requirements vary according to the assigned use for that room, e.g., permanent party, transient, or special training use. These terms are defined in Section 1, along with Navy and Marine Corps guidance for each module type. The modules are (1+1), (2+2), (2+0), and open bay.

a) (1+1) Apartment module (Figures 1, 2, and 3) consists of:

(1) A gross apartment size of 46 sq. m. (this includes the sleeping area, closets, bathroom, and service area);

(2) 11 sq. m. sleeping room;

(3) 2 sq. m. closets (one per person);

(4) Bathroom or shower area (shared by no more than two people);

(5) Service area;

(6) Single apartment control of heating and cooling year round; telephone and cable television wiring in each bedroom.

b) (2+2) Apartment module (Figures 4 and 5) consists of:

(1) Gross apartment size of 55 sq. m. (this includes the sleeping area, closets, bathroom, and service area);

(2) 180 sq. ft. sleeping room (90 sq. ft. sleeping area per person);

(3) 2 sq. m. closets (one per person); (closets may be less than 2 sq. m. per person in renovations only);

(4) Bathroom or shower area (shared by no more than four people), a service area;

(5) Single apartment control of heating and cooling year round;

(6) Telephone and cable television wiring in each bedroom.

c) (2+0) Apartment module (Figure 7) was created by splitting a basic module into two separate apartments by a center wall. Therefore a (2+0) module two separate apartments consisting of:

(1) Gross apartment size of 65 sq. m. (this includes both apartments, sleeping areas, closets, bathroom, and service area);

(2) 180 sq. ft. sleeping room (90 sq. ft. sleeping area per person);

(3) 2 sq. m. closets (one per person);

(4) Private shower compartment (shared by no more than two people);

(5) Private water closet compartment;

(6) Service area;

(7) Single apartment control of heating and cooling year round;

(8) Telephone and cable television wiring in each bedroom.

d) Open bay (Figure 8) consists of:

(1) Open sleeping area with portable wall partitions defining per person berthing.

(2) Gang shower areas with eight person capacity;

(3) Water closet facilities, eight stalls minimum.

3.3 Module Access. There are three basic ways of access to an apartment.

a) By exterior landing, "garden style" (Figure 1);

b) By exterior corridor or balcony, "motel style" (Figure 2);

c) By interior corridor, "hotel style" (Figure 3).

3.3.1 Exterior Landing Access. Exterior landing access to housing not more than three stories in height is often called "garden style" (Figure 1), this configuration makes efficient use of available real estate while avoiding additional costs associated with buildings over four stories in height. Use of residential grade construction in conformance with NFPA 13R, Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height, results in savings in materials, and housing contractors are more familiar with construction methods.

3.4 Exterior Corridor or Balcony Access. Exterior corridor access from an exterior walk or balcony supports outside social interaction. Residents in exterior corridor style housing tend to close their window coverings to gain privacy from outside walkways. Single loaded exterior corridor style housing provide increased exposure of outside walls and coupled with elimination of pipe chases provides features similar or equivalent to garden style housing. This is sometimes called "motel style" (Figure 2).

3.5 Interior Corridor Access. The interior corridor style housing is entered from an interior corridor. Vertical mechanical and plumbing chases, elevators, trash chutes, and safety and structural space can increase a mid-rise building size as much as 4 sq. m. per module. This translates into a 6 percent increase in building costs. The view from interior corridor style living unit windows can be direct to the exterior without having to look across a balcony. Interior corridor style housing generally supports interior socialization. This is sometimes called "hotel style" (Figure 3).

3.6 Life Cycle Cost Analysis. A life cycle cost analysis was prepared to compare these access styles for Navy bachelor housing. The garden style was found to offer the lower first cost, provide the most residential appearance, and meet most quality of life goals. Operations and maintenance costs for equivalent quality of life type apartments in each building style were similar.

3.7 Recreation and Community Areas. Provide one sand volleyball court and one full outdoor basketball court per 300 residents if not available within 1/2 kilometer. Similar outdoor

recreation facilities can be substituted. Picnic areas and barbecue areas are required for all bachelor housing. All outdoor recreation used exclusively for bachelor housing will be accounted under a bachelor housing category code.

3.8 Required Spaces. Consider the following spaces listed and provide within a bachelor housing complex except when similar facilities are within walking distance on base. Services should not be duplicated.

a) Required spaces:

- (1) Living/bedroom area;
- (2) One bathroom per apartment;
- (3) Closet per person;
- (4) Service area;
- (5) Laundry facilities;
- (6) Bulk storage;
- (7) Utility space;
- (8) Mail service (Navy); mail service is optional for the Marines;
- (9) Circulation space;

b) Optional spaces are:

- (1) Multipurpose space;
- (2) Game room;
- (3) Vending area;
- (4) Public toilets;
- (5) Supply storage room;
- (6) Administration area/reception area.

Table 3, provides a suggested furniture, furnishings, and fixtures list.

3.8.1 Sleeping Room/Bedroom. The allowable sleeping room area is the net living space for each E1 to E4 personnel assigned to a room.

a) For permanent party personnel, the minimum net living area is 11 sq. m. per person. See Figures 1, 2, 3.

b) For transient party personnel, the minimum net living area is 90 sq. ft. per person. See Figures 4, 5, and 6.

3.8.2 Personal Closets. Provide one in-room storage closet located in each bedroom per person. Provide each closet with closet organizers with storage extending to the ceiling, and solid core wood doors with heavy duty, lockable hardware. A separate locking hasp allowing for personal keyed locks is acceptable. Provide additional storage in service areas as appropriate. Closets should be full height, using the space above normal door height for bulk storage. Provide continuous ventilation in closets to resist mold and mildew growth. Personal closets are to be a minimum of 2 sq. m. (Figures 4 and 5). (2+2) closets may be smaller for renovations which do not provide allowance, as shown in Figure 6.

a) Provide integral full-length hanging rods for coats and shelves. Refer to the suggested furniture and fixtures schedule, and par. 4.44.

b) Light all closets. A light with motion activated switch is required in deep closets and is recommended in others. Carefully placed lighting outside 2-foot-deep closets is acceptable. The goal is to allow clear view of closet contents and, in the case of clothes closets, to facilitate color choice and dressing. Refer to par. 4.49.

c) Secure closets with standard hinged doors with non-removable pin hinges and locking hardware. Bi-fold and sliding doors are not acceptable since they are less durable than hinged doors.

3.8.3 Bathroom/Toilet Facilities

a) (1+1) modules (Figures 1, 2, and 3) provide one bathroom per apartment module to be shared by two E1 to E4 personnel. For new construction, provide bathrooms with a combination tub and shower.

b) (2+2) modules (Figures 4, 5, and 6) provide one bathroom per apartment module to be shared by two E1 to E4 personnel on each side, or a total of four persons. For new construction, provide bathrooms with a combination tub and shower. A shower-only configuration may be maintained in renovation, but a tub and shower conversion is preferred.

c) (2+0) modules (Figure 7) consist of two separate apartments. Each apartment provides one water closet compartment, and a shower compartment to be shared by two E1 to E4 personnel occupying each apartment.

3.8.4 Service Area. Service areas vary by apartment type as follows:

a) (1+1) Apartment Modules (Figures 1, 2, or 3). This service area consists of a minor food preparation area and includes cabinets with countertop and kitchen sink, overhead cabinets with space for microwave, microwave, under-counter refrigerator with freezer compartment, bar countertop seating two persons, and optional bulk storage or shelving.

b) (2+2) Apartment Modules (Figures 4, 5, or 6). This service area consists of a vanity with lavatory and valance lighting, refrigerator/microwave area, and access to closets and bathroom area.

c) (2+0) Apartment Modules (Figure 7). Each apartment contains a service area consisting of a vanity with lavatory and overhead valance lighting. The vanity may accommodate an under-counter refrigerator. Larger refrigerators may be accommodated in the sleeping room. The service area also provides access to closets and separate compartments for shower and water closet.

3.8.5 Laundry Facilities. Provide one washing machine and two dryers for every six residents. Locate the laundry room for easy access and provide acoustic separation from other areas. Consider locating the laundry room adjacent to a lounge area to provide a place from which to monitor one's laundry. Provide 3 linear meters of folding table with hanging rod above and 1.25 meters of full height hanging for drip dry clothing.

3.8.6 Bulk Storage

a) For the Navy. Provide lockable bulk storage space outside of the apartments for personal items. Examples of items typically stored in bulk storage areas include luggage, original

stereo system cartons, snow tires, bicycles, surf boards, ski equipment, and other sports gear. Most storage is limited to rectangular cubes, but a limited shape variety is needed for masts and other bulky items. Also refer to par. 3.9.

b) For the Marines. Bulk storage is accommodated in the apartment closets.

3.8.7 Utility Space. Provide appropriate space for the mechanical and electrical systems. Note that up to 4 sq. m. per module may be added to the allowable building gross area for structures four stories or higher.

3.8.8 Mail Service

a) For the Navy. Provide one U.S. Postal Service approved mailbox per resident. The mailboxes may be located indoors or in an outdoor covered area, gazebo, or where size warrants, or even in a separate enclosed building subject to local postal rules. Prior to design, the bachelor housing manager and public works office should discuss plans with local postmasters.

b) For the Marines. No in-building requirements (optional).

3.8.9 Circulation Space. Arrange corridors to emphasize apartment entrances. Consider providing a recessed light at each entrance. Size the corridor to meet NFPA 101 requirements with a minimum clear width to accommodate two persons with suitcases, about 1600 millimeters.

3.8.10 Multipurpose Space. Provide area for individual recreation, group activities, training, and meetings. Isolate the area acoustically, and locate close to public toilets. Provide a counter on which to set a microwave oven, waste receptacles, and other similar food warming equipment. Provide locked storage for related supplies and for equipment. Provide the space with light and power. Finishes should be easily cleaned and endure hard use. Provide a large screen television acoustically isolated as appropriate, and reasonably close to public toilets. Provide window coverings and hardware to allow for darkening room with blinds or shades and provide light dimmers. Finishes should be easily cleaned, and endure hard use and food spills.

3.8.11 Game Room. Provide a room acoustically isolated as appropriate, with appropriate electrical outlets, and close to public toilets. Design for installation of electronic video games. Locate for appropriate monitoring by bachelor housing personnel. Finishes should be easily cleaned, and endure hard use and food spills. This can be considered an optional feature.

3.8.12 Vending Area. Provide vending space with appropriate outlets. Allow space for ice dispenser, and soft drink and food vending machines, at least one 460 millimeter diameter waste receptacle, and at least one 765 millimeter diameter recycling container. Locate space for security of users and for ease of service. Provide appropriate sound isolation between vending and other spaces. Recess the machines into the wall or provide treatment area to give a recessed appearance. Provide an accented floor surface and a dropped ceiling with open grid type panels or acoustic tiles to accent the vending area. Drop the soffit above the machines to the top of the machines. Coordinate paint or wall covering with the interior designers concept of the facility. Mirrored panels, cove lighting, and neon lights are optional. Floor and base finishes should resist heavy wear and be easily cleaned. Discuss vending area requirements, and machine quantity and type at the activity level.

3.8.13 Public Toilets. Provide public toilets accessible from the lobby and the public areas. Provide commercial grade fixtures. Provide a minimum of one water closet, one urinal, and two sinks in the men's toilet; two water closets, two sinks in the women's toilet for a 96 personnel project. Add one of each fixture for each personnel increment of 100 to a maximum of five toilets. Public toilets must be accessible to disabled persons. Provide overhead lighting and light at the lavatory mirror. Provide floor and wall finishes as described in Table 2. Use solid surfacing material for lavatory counters and solid plastic, continuous anchorage toilet partitions. Provide a floor drain placed out of the usual traffic pattern and close to the water closets. Include dispensers for soap, towels, toilet tissue, and waste receptacle.

3.8.14 Supply Storage Room. Provide one secure space of about 23 sq. m. net area for housekeeping equipment and supplies. Finish floor, base, and wall at the mop receptor to resist water. Quarry tile or ceramic tile are examples of acceptable finishes. Provide motion-activated light.

3.8.15 Administrative Area. Provide the staff with a secure, efficient, and comfortable environment from which to manage the building.

a) Reception Desk. Provide area for enclosed space or counter/workspace. Locate the counter for visual control of the lobby and other central common spaces. Arrange the counter for check-in by several persons at once with electronic cash register and computer, key control, and forms storage. Light counter surfaces for writing, mount duplex outlets above work surface, and provide computer and telephone cables and connections.

b) Office Space. Provide other administrative office spaces as required.

c) Locate the lobby and its vestibule for easy identification by arriving guests. Include a seating area for visitors and guests waiting for transportation. Locate the seating area for clear view of arriving automobiles and of the front desk. Choose and arrange lighting fixtures to organize and identify the space. Finish the lobby and entrance with attractive, durable, and easily cleaned materials.

3.9 Public Telephones. Enclose cubicle on at least three sides and provide a writing surface and a fixed seat. Provide at least one cubicle that is accessible to disabled persons.

3.9.1 Telephone. Naval Exchange Command (NEXCOM) is the Navy unofficial telephone program manager. In accordance with NAVFAC/NAVCOMTELCOM memorandum of agreement, construction projects include pre-wiring buildings for telephones. Use the NEXCOM contract for connection of telephones unless another existing contract is in place.

3.10 Cable Television. Provide cable television capacity to each bedroom with access jacks located as shown on each plan. Pre-wire buildings or provide empty conduits with pull wires during construction and renovation projects to hide the wiring. Surface mounted wiring is not permitted.

3.11 Exterior Storage Lockers

a) For the Navy. NEXCOM will consider offering personal storage lockers in fleet areas to offer the sailor personal storage while deployed. NEXCOM would establish a contract with a private storage company which would offer a substantial savings to the sailor versus the prevailing rate.

There would be no investment requirements, but land would have to be designated and incorporated in the early planning stages of the project design. Contact NEXCOM for specific requirements for this feature.

b) For the Marines. The Marines may contact the Marine Corps Exchange for additional storage provisions.

Section 4: QUALITY STANDARDS

4.1 Site Planning. Site planning requires an interdisciplinary involvement of the community planner, landscape architect, architect, interior designer, and civil, mechanical, and electrical engineers. Analysis of existing site conditions (e.g., utilities and plant material, traffic patterns, land use, community facilities, and off-site workplaces) is needed for effective site design. Evaluate and analyze the following site quality standards to ensure the optimum solution is selected.

4.1.1 Orientation. Site bachelor housing to take advantage of the positive features of the site. Provide protection from undesirable winds and glare, shading from excessive sun in warm climates, and orientation of operable windows to take advantage of summer breezes.

4.1.2 Site Organization. Pay special attention to building orientation, mass, and scale in developing the site plan. Develop a sense of order, arrival, orientation, and community in planning the site. Site housing in relationship to one another to create outdoor spaces for use as passive or active recreation areas. Achieve spatial balance and scale through thoughtful placement and arrangement of structures, landscaping, and landforms. Organize the site using functional zones and the appropriate relationship of functions. Intermittent functions such as trash collection, vending machine service, furniture moving, and mechanical repair should not interrupt residents' activities.

4.1.3 Circulation Systems. Grade walkways and size to allow barrier-free access to the first floor of buildings and to outdoor areas. Light walkways for safety without spilling light into residential units. Walkways should be located and sized to pleasantly and efficiently connect residents with site amenities, parking, station transportation, community facilities, jogging trails, and workplaces. Place walkways with emphasis on functional rather than formal needs. Walkways to building entrances should be 8 feet (2.5 meters) wide. Other sidewalks are 6 feet (2 meters) wide.

4.1.4 Vehicular Access. Provide access to the bachelor housing from secondary (collector) streets to reduce congestion associated with main arterial streets. Where possible, divide main entrances with landscaped traffic medians between entry and

exit lanes. Because of high volume of traffic using the entrances, the width of non-divided entrances should be a minimum of 7.5 meters in width.

4.2 Parking. Resident, visitor, staff, and service personnel parking should be convenient, safe, and pleasant to use. Parking should be accessible to persons with disabilities and should be placed convenient to the building entrance. Locate and shape parking areas to improve the residential environment. Use land forms such as berms, retention ponds, and tree islands to separate parking from other functional zones and to buffer the residential area from possible surrounding adverse environment. Provide parking in these amounts:

a) Automobile parking for recruit barracks and "A" school is optional; permanent and transient at a minimum of 70 percent of residents.

b) Motorcycle parking for 5 percent of residents. Provide dedicated space with concrete paving and tie-downs.

c) Bicycle parking for at least 15 percent of residents. Provide secure, weather protected, conveniently located facilities.

d) One visitor space per 50 residents (2 percent).

e) Staff parking for each staff member.

f) Barrier-free parking spaces (e.g., residents, visitors, and staff in accordance with FED-STD-795, Uniform Federal Accessibility Standards (UFAS) and Americans With Disabilities Act Accessibility (ADAAG)). Use the criteria that provides the greatest barrier-free design requirements.

g) Maintenance parking for service functions. Dedicated space is not required. Use expected frequency of use to determine whether dedicated parking is needed. Locate service access and parking to avoid disturbing residents.

4.3 Service to the Building

a) Vehicles. Design access streets and parking areas to accommodate service vehicles and fire protection equipment. Where interior court areas are being proposed between adjoining bachelor housing, consider designing the main pedestrian walks to accommodate service and fire protection vehicles. For example,

the minimum width of such walkways should be a minimum of 2.5 meters (8 feet) wide and should be constructed using reinforced concrete to accommodate medium weight vehicles. Consider treating the walkways with a patterned concrete system to minimize the negative impact of the wider access route. Use materials such as concrete grass road type pavers to provide access for infrequent service vehicles.

b) Entrances. Where possible, separate service entrances associated with mechanical rooms or mechanical enclosures from parking areas.

4.4 Bus Route Access. Consider developing shelters and walks to serve personnel needs if the base provides bus service. Bus shelters should be compatible with the architectural style of existing buildings, Base Exterior Architectural Plan (BEAP), and existing bus shelters on base. Where existing shelter design needs upgrading, the site planner should coordinate with the base in selecting a new style that is programmed with new projects. Program at least one bus stop shelter for each major housing complex.

4.5 Utility Corridors. The site planner should develop utility corridors in coordination with the base community planner, electrical, mechanical, and civil engineers. Size corridors to accommodate future expansion. Locate utility corridors not closer than one and one-half times the crown width of mature trees or 10 meters, whichever is the greater amount. Locate utility corridors to allow for future street tree plantings.

4.6 Fire Protection Access. Site bachelor housing a minimum of 12 meters laterally from the closest adjoining building. Provide access to fire protection vehicles from three sides. Obtain width, weight, and turning radii of firefighting vehicles from the base fire department.

4.7 Site Lighting. Site lighting is an integral part of any bachelor housing project. Provide lighting to ensure occupants have a means of safely moving between outdoor spaces. Refer to the BEAP in the selection of luminaires and poles and signs. Provide adequate site lighting at any point where there is a change in grade requiring steps, near handicapped and motorcycle parking areas, and near main entrances to buildings. Use the recommendations of the Illuminating Engineering Society of North America (IES) Lighting Handbook to establish illumination levels.

4.8 Site Furniture. Site furniture that is in harmony with the architectural style of the bachelor housing facilities, compliments the building, and makes the outdoor spaces more usable and organized. The landscape architect should coordinate the selections with the architect and interior designer to ensure smooth transitions are made in the procession from within the building to the outdoors and vice versa. Effective transitions are affected when building materials, colors used in the building exterior and interior areas, and design details from the building are incorporated into the paving materials and site furnishings. Durable site furnishings are to be used to support various site functions. Consider trash receptacles, seating, picnic shelters and grills, lighting, and bus shelters.

4.9 Finished Floor Elevation (FFE). Establishing the finished floor elevation of bachelor housing is one of the most important aspects of site planning. The FFE affects grading, cut and fill, and visual impact of the facility and interior-exterior transitions. In addition, the FFE has a significant impact on the landscape architect's ability to effectively introduce plant materials into the new environment. When the approach is to "level the site" without sensitivity to other demands, the results lack visual interest. The landscape architect, architect, and civil engineer should work closely together to achieve the most optimum design results.

4.10 Storm Drainage. Depending on the geographic location and the availability of nearby subsurface storm drains, provide underground storm drainage for each bachelor housing complex. Either intercept site water in drop inlet structures or design to drop directly into a subsurface system. If subsurface storm drains are not available at the proposed site, then program them as part of the bachelor housing project. As a minimum, divert surface water to an underground system to a point where it is discharged into aboveground storm drains. Discharge water from downspouts onto splash blocks. Provide for drop inlets as necessary to intercept surface runoff and prevent walkways from being flooded.

4.11 Mechanical Enclosures. Screen mechanical equipment such as chillers, evaporating condensers, switchgear, and electrical transformers. Architectural screening materials should compliment the architectural style and materials used to construct the bachelor housing. Use landforms to screen objects in the landscape that do not require enclosures.

4.12 Trash Dumpsters. While trash dumpsters should have convenient access by the residents and by large trash handling trucks, locate dumpsters in areas away from main entrances. Screen trash dumpster locations with any combination of hard wall materials, earth forms, and landscaping to reduce their impact. Where hard wall materials are used, the materials should compliment the materials used in the project and adjacent facilities.

4.13 Planting and Vegetation. Develop plantings to create an aesthetically pleasing landscape that conserves water and resources while minimizing maintenance requirements. Proper planning and design, plant selection, and use of turf alternatives and mulch materials, zoning of plants in accordance with water requirements, soil improvements, efficient irrigation, and appropriate maintenance are the fundamentals of good landscape planting.

4.14 Landforms. The landscape architect and the civil engineer should work together to use landforms to soften the impact of parking on the landscape. Use landforms such as mounds and swales in conjunction with landscape plant materials to soften or obscure the parking areas, provide spatial articulation, or enhance drainage structures or surface water retention areas. Use landforms to add interest and diversity to the project. In particular, landforms can perform an important function around outdoor activity areas by screening undesirable views.

4.15 Grading. Grade the site to achieve an orderly transition from the point where personnel enter the site by automobile or on foot to the point where personnel are at the first floor elevation. Consider the impacts of the parking area, the bachelor housing, bus stop shelters, sidewalks, outdoor passive use areas, mechanical equipment, and trash dumpsters on site grading. Where appropriate, use grading to control the negative impacts these man-made facilities have on the visual environment, such as shielding trash dumpsters, etc. Housing tend to be linear and relatively narrow in their configuration; therefore, lending themselves to an orientation paralleling existing contours. Determine if storm water retention is required by local building codes. Where on-site retention is required, carefully consider the location of retention areas in terms of the function as well as their visual impact. Use large retention sites for outdoor recreation areas.

4.16 Visual Enhancement. Plantings made for utilitarian purposes, such as screening service areas or shading, will simultaneously improve the attractiveness and enhance the livability of an area. The use of shrubs and small trees arranged in strategic groups around a building improves the appearance by softening structural lines. This also helps in integrating the building with its site and diverting attention from unattractive structural features. Screen unattractive views or objects identified by the site analysis with appropriate plant material to obscure their negative impacts. Examples of screening needs include trash dumpster areas, pad-mounted electrical transformers, parking areas, and mechanical yards. While plant materials can be used solely for screening purposes, a combination of plant and architectural materials offers an ideal solution to screening needs. Landforms coupled with plant materials will provide an immediate effect while waiting for the plant materials to mature. Skillful use of plant materials around buildings, along walkways, and around parking areas significantly increases the energy efficiency of buildings and reduces the ambient air temperature around the bachelor housing project. By intercepting the direct and reflected radiation, plant materials control the absorption of heat energy by the building and parking areas.

4.16.1 Wind Control. Use plants as wind control devices by breaking, guiding, deflecting, or filtering the wind. Knowledge of the direction and speed of prevailing winds at different seasons of the year is necessary. The most effective density is a screen of approximately 60 percent. Irregular forms provide a more effective windbreak than evenly spaced plants. A variety of plant species and sizes also provides a better windbreak than one consisting of one species. For climates where occasional to frequent snow accumulation occurs, consider how wind affects snow drift.

4.16.2 Spatial Articulation. Use plants to create enclosed spaces and to separate spaces one from another. Also use plants to direct people through outdoor spaces by visually defining and reinforcing patterns of movement. The degree of enclosure, separation, or movement depends upon the density, form, and type of plants used, keeping in mind deciduous plants vary with the season, whereas most evergreen trees do not.

4.17 Landscape Maintenance. Provide landscape establishment and maintenance within the initial contract for installation of plant materials. The duration of the establishment period should be one year in all cases and should not be included as a contract

option. The establishment requirements should include irrigation, mowing and edging, replacing mulch, inspection and control of pests and weed control, tightening staking and guying materials, pruning, fertilization, and maintaining watering saucers.

4.18 Irrigation Development. Minimize water requirements through use of plants that are suitable for growing in limited water environments. Provide bachelor housing projects developed in arid and semi-arid climatic regions with irrigation systems. Use bubbler or drip irrigation systems adjacent to building facades to minimize impact of overspray. Provide irrigation systems with solid-state automatic multi-station controllers, state-of-the-art control valves, and backflow preventers in accordance with the appropriate building codes. In cold climates, locate backflow preventers in the mechanical room. Where freezing is not a problem, locate backflow preventers within screened mechanical enclosures. Include adjusting turf spray coverage, duration of watering cycles, repairing leaks, and general maintenance to ensure proper functioning during the maintenance period for irrigation systems. Water conservation is a high priority factor in development of the irrigation design.

4.19 Active Outdoor Recreation. Support active outdoor recreation by providing sand volleyball court and full basketball facility or other appropriate amenity. Light at least some of these facilities for evening use. The number of courts or area to be lighted is to be determined by local conditions.

4.19.1 Passive Outdoor Recreation. Passive outdoor recreation is to be supported by grouped seating, picnic facilities, and lawns with shaded areas. Locate these recreation functions to reduce interference from other functions on and near the site. Shelter or screen active and passive recreation facilities to temper wind and other climate elements.

4.19.2 Recreation Structures. Where appropriate, install a pavilion as an integral part of the bachelor housing complex. Pavilions should compliment the architectural style and materials of the bachelor housing. Compliment these multi-use areas with additional facilities such as barbecue grills, tables, benches, lighting, and landscape plant materials.

4.20 Building Organization. Form buildings to make arrival and movement through them orderly and clearly understandable by users (visitors, residents, staff, and service personnel). Use circulation to organize and zone activities and to promote

physical security. Provide a clear entrance to the building and to different functional areas within the building. Locate functions and shape circulation space serving functions to ensure the safety of users.

4.21 Building Styles. Bachelor housing may be designed using any one of three building styles: garden style, exterior corridor style, and interior corridor style. Garden style (Figure 1) is preferred for its high quality of life and lower life cycle costs for Navy projects only.

4.22 Building Types

a) "Low rise" describes structures of three stories or less (Figure 1).

b) "Mid rise" and "high rise" describe structures of four stories or more. (Figures 2 and 3 for (1+1); Figures 4 and 5 for new (2+2) construction; Figure 7 for (2+0); Figure 6 for (2+2) renovations; and Figure 8 for open bay.)

4.22.1 Quality in Privacy. Privacy for residents is of utmost importance. Recognize that bachelor housing serve as homes for the residents, and design accordingly. Exterior corridor and garden style housing allow greater privacy.

4.23 Architectural Character and Scale. The architectural character of the facility should be in context with its surroundings, and relate not only to the immediate site and adjacent buildings, but also to the base itself. The desired architectural character is usually defined in the BEAP which most installations have published. These standards provide a basis for compatibility and order within the built environment. The intent of these standards is not to create "sameness," but to promote a sense of harmony and respect for local and regional design standards. The following elements are part of a successful design solution.

4.23.1 Regional Character. Some of the local influences that affect regional character fall under the category of historic, ethnic, cultural or traditional, topographic, and/or climatic. Well designed housing respect the characteristics of the built environment in the local region through architectural style, choice of construction techniques, materials, and form.

4.23.2 Residential Character. Housing should provide a residential environment through both exterior and interior

elements. Exterior building forms are to signal the residential character of bachelor housing. These residential images can be reinforced through the following:

- a) Provide gable or similar roof shapes.
- b) Limit building height to three stories unless extreme land shortage can be documented. Where three stories cannot be used, investigate using several building heights to introduce some residential qualities to the complex.
- c) Bay windows may be used to change the exterior appearance from institutional to more residential.

4.23.3 Compatibility. Achieve architectural compatibility by integrating a vocabulary of scales, forms, color palettes, and materials that blend with and respect the built and natural environment. The result is a combination of facilities that compliment each other and create balance and harmony. Architectural compatibility guidelines are not intended to compromise design expression, but rather to provide a framework for the development of quality design.

4.23.4 Orientation. Orient buildings or groups of buildings with sensitivity to climatic conditions. Solar gain and prevailing winds can enhance energy conservation and affect a significant cost savings. Building placement and design should take advantage of views that are scenic, pleasant, or interesting. Designers should be sensitive to the approaches to the facility and strive to create a clear sense of arrival for newcomers. Design roof overhangs to work with sun angles to provide solar shading. This configuration is a built-in by-product of bachelor housing that have exterior balconies. Achieve mutual shading sensitively arranging adjacent structures. Avoid excess east or west facing glass and design for maximum cross ventilation where feasible. Also consider security requirements as defined for the project by the risk evaluation. Refer to par. 2.17.

4.23.5 Human Scale. Architectural scale is defined as the comparative relationship of a structure or space to the human form. Individuals perceive a sense of personal comfort based on influences from their physical environment. Those environments that enable a person to feel comfortable and accepted as a part of the environment are considered to possess a "human" scale. The height, form, and bulk of a building or space as well as its formal relationship to other buildings or spaces contribute

equally to achieving this sense of scale. Housing should provide a homelike environment with an architectural scale that imparts a clear sense of relative comfort, ease, and satisfaction.

4.23.6 Building Mass. Building mass is defined as the overall bulk or total volume of space a building occupies. Large buildings such as bachelor housing, aircraft hangars, and maintenance facilities often have a greater relative mass than other buildings on a base. Modulating the form and facade of these buildings with setbacks, repetitive details, and less dominant colors softens their physical appearance and develops a blending of facilities in terms of their form, proportion, and perceived size. The size, shape, proportion, repetition, and placement of design features such as fenestration, roofs, and columns are elements that combine to project the architectural character of a building. Building form should reduce the impression of size and institutional regularity and emphasize more individual interior and exterior scale.

4.24 Life Safety. Provisions for life safety should conform to requirements in NFPA 101. Occupancy of bachelor housing is classified by MIL-HDBK-1008C, Fire Protection for Facilities Engineering, Design, and Construction, as personnel housing, by NFPA 101 as interior corridor or dormitory for recruits, and as apartments for all others. Use the more stringent requirement where regulations conflict.

4.25 Fire Protection Sprinkler System. Provide sprinkler systems in bachelor housing. For both new construction and rehabilitation projects, install in accordance with NFPA 13R. Fire protection systems should conform to MIL-HDBK-1008C and to NFPA fire codes, particularly NFPA 101. Bachelor housing are classified by NFPA as new interior corridor and bachelor housing occupancy or as existing interior corridor and bachelor housing occupancy (in the case of minor renovation projects). Fire and life safety safeguards should comply with requirements of this occupancy. Mid rise/high rise bachelor housing should be protected throughout by an approved, supervised automatic sprinkler system installed in accordance with requirements specified in NFPA 101, NFPA 13R, and other fire codes referenced therein.

4.26 Fire Alarm Systems. Install fire alarms systems compatible with base systems and connected to the base system.

4.27 Smoke Detectors. Provide each bedroom and each living room with a smoke detector powered from the building electrical

system. Provide heat and smoke detectors in other public and service spaces as required by MIL-HDBK-1008C, and the reviewing fire protection engineers. Locate smoke detectors on walls in accordance with NFPA 72, National Fire Alarm Code.

4.28 Exit Egress. Travel distance to exits is of particular concern in designing housing. The placement of stair towers or stairwells should be part of the preliminary building planning process. This requires experimentation to determine the maximum number of living units which can be served by one stair while still conforming to the maximum allowable travel distance. Construction of the fire wall, ceiling, and floor assemblies around each living unit is another issue of paramount importance to bachelor housing design. Closely coordinate the construction of such assemblies as required by NFPA 101 with the sound attenuating techniques used.

4.29 Accessibility Requirements. Barrier-free design should be in accordance with the requirements of the UFAS as required by 42 U.S.C. 4151-4157, Architectural Barriers Act of 1968, and consistent with 29 U.S.C. 794, Rehabilitation Act of 1973, but also to meet the requirements of the ADAAG. Use the criteria that provides the greatest barrier-free design requirements. Spaces in bachelor housing that are open to the public, civilian staff, visitors, and transients should be barrier free. In transient bachelor housing at least 5 percent of the apartments should be barrier free. Apartments in housing serving only able-bodied personnel are not required to be barrier free. Refer to the References section for additional information.

4.30 Acoustics. Careful attention to acoustic design is required for bachelor housing to ensure a high degree of privacy for residents within their living units and in study areas. Designers should address isolation of noise from a variety of sources, including:

- a) Adjacent living units.
- b) Spaces on a floor level above or below.
- c) Hallways and balconies.
- d) Mechanical rooms and systems.
- e) Exterior generated sound such as aircraft and automobile noise.

f) Walls between living units and between living units and corridors, and exterior walls of living units should have a sound transmission class (STC) of at least STC 50.

g) Floor and ceiling assemblies should be at least STC 55 and have an impact isolation class of at least impact insulation class (IIC) 60. Telephone, cable television, convenience outlets, and mechanical ducts should not compromise the acoustical integrity of wall, floor, or ceiling assemblies. Select fluorescent lamp ballasts to minimize noise generation.

4.31 Structural Selection. Recognize that housing are modular and repetitive in nature; therefore, decisions concerning the structural system have substantial affect on construction costs. Coordinate column spacing and layout with the building's floor plan so that they occur within or in alignment with walls. Hold columns occurring within spaces to a minimum and limit them to larger public spaces such as the laundry room. Analyze the proposed structural system that is the most economical method of realizing the architectural design intent. Select an economical structural system based on:

- a) Facility size
- b) Projected load requirements
- c) Subsoil conditions
- d) Local availability of materials and labor
- e) Feasibility of prefabrication
- f) Local construction practices
- g) Resistance to fire, wind, snow, seismic, geologic, and permafrost conditions

4.31.1 Vapor Barriers. Calculate vapor permeability and temperature through the entire wall sections including interior finishes to ensure dew point does not occur within the wall system. Special construction considerations not limited to heating, ventilating, and air conditioning (HVAC) systems are required in humid areas.

4.31.2 Roof Systems. Design and detail roof systems to resist maximum wind for the area. Provide a residential character through the use of gable or similar sloped forms.

4.31.3 Doors. Specify doors, frames, and hardware to meet sound separation, fire separation, and security requirements unique to bachelor housing. Bedroom doors may be vented as necessary for HVAC movements. Exterior doors should be fully weather-stripped and include a heavy-duty metal threshold which prevents drafts, dirt, water, and insect entry. Exterior doors should be solid core, thermally insulated.

a) Provide lobby and entry vestibules with glass commercial style store front doors with automatic openers for major entrances. Bachelor housing managers should designate which entrances require this feature.

b) Other entry doors should be solid core wood or thermal insulated metal to provide sound separation.

c) Provide apartment entry with solid core wood or thermal insulated metal door to provide sound isolation. Provide a wide angle peephole and electromechanical or plastic coded key lock system.

d) Provide bedrooms with solid core wood door with ventilation openings as required for the apartment system. Provide a lock with non-removable hinge pins and keyed to match the associated closet door only.

e) Provide closets and bedrooms with solid core wood doors with non-removable hinge pins and locking hardware keyed to match the closet door lock with its associated bedroom door locks.

4.31.3.1 Hardware and Locks. Provide dead bolt locks, and night latches, peepholes, keys without room numbers, and door guard. Hinges should conform to Builders Hardware Manufacturers Association (BHMA) 101, Butts and Hinges. Use of plastic key cards (smart cards), programmable locks, or magnetic reader cards are preferred over key/tumbler hardware. Navy and Marine Corps hardware requirements are different.

a) For the Navy: Provide a key to each sailor which opens the apartment entry door, one sleeping room door, and one closet, without access to the other sleeping room or closet.

b) For the Marines: Provide a key to each Marine which opens the apartment entry door. Provide hasp hardware for personal closets.

4.31.4 Windows. Place windows to avoid breaking and entering, e.g., by reaching adjacent entry door hardware and to avoid other means of breaking and entering. Size glazed opening equal to at least 10 percent of apartment floor area. Size the operating section to meet NFPA 101 standards for egress.

a) Specify commercial grade window with heavy-duty insect screen for operating section. Consider insulating glass and thermal break frames for comfort where heat loss does not require it.

b) Use tight-fitting, insulating, commercial grade windows. Solar glazing with low "E" glass is required in regions with plentiful sunlight. Install heavy-duty insect screens on operable windows. Size windows at between 10 and 15 percent of the floor area they serve. Windows serving residential units should be operable and sized for emergency egress. Windows should be compatible with the type of window coverings desired.

c) At exterior corridor style configurations, where windows are likely to be kept covered for privacy, higher fenestration with a separate covering mechanism is recommended to allow light to enter the room while maintaining privacy at eye level.

4.31.5 Walls and Partitions. Design walls and partitions to meet appearance and acoustic and durability requirements of bachelor housing.

a) Choose wall and partition assemblies to provide at least 50 decibel sound separation between apartment and adjacent spaces on the outside. Place electrical outlet boxes, HVAC openings, etc., to maintain the sound separation of the wall assembly. Clearly direct the Contractor to seal edges of wall assemblies to adjacent construction to avoid flanking sound paths.

b) Specify smooth durable finishes for walls and partitions in apartments. Public spaces may include other than smooth surfaces for architectural emphasis. Consider ease of repair and refinishing when choosing wall finishes.

c) Provide stud walls covered with dry wall for one hour minimum fire rating, or as required by code. For the Navy, exposed concrete masonry unit (CMU) walls in new construction should not be exposed in living spaces, or public areas and

should dry wall finish or smooth plastered finish. For CMU walls in renovation. The Marines prefer masonry construction and finish.

d) Locate vapor barriers to allow venting of wall assemblies and avoid trapping moisture within wall assemblies. Review the use of materials such as vinyl wall covering and foil faced gypsum board that may act as vapor barriers carefully.

4.31.6 Ceilings. Ceilings should be off-white. Suspended acoustical tile is prohibited.

4.32 Interior Design. See Table 2 for additional information. Interior finishes should comply with the requirements of MIL-HDBK-1008C, par. 2.7.

4.32.1 Wall Finishes. Use a Type II (minimum 20 oz./lin. yd.) vinyl wall covering over smooth walls. Accent walls are optional, but should not be so bright or so dark as to shorten the room or negatively affect the interior lighting. Consider a textured wall covering as an accent instead of a dramatic contrasting color. Accent colors can be introduced in textiles used as draperies and upholstery fabrics. Avoid exposed CMU block walls as an interior wall finish for Navy projects. Exposed CMU block walls are acceptable as a finish surface for Marine Corps projects.

4.32.2 Paint

a) Paint interior surfaces, except factory pre-finished material, a minimum of one prime coat and two finish coats. Paint walls and ceilings in kitchenette, toilet, core areas, laundry, and utility rooms, and painted trim with latex semi-gloss enamel. Other interior finishes should be semi-gloss. Blown-on acoustic finish is not allowed, except in public core areas. Textured paint is optional in some ceiling areas. See Table 2.

b) Exterior surfaces requiring painting should receive a minimum of one prime coat and two finish coats. Wood trim frames, etc., should be back primed. Exterior semi-transparent sealing stains should have two coats minimum.

c) Select neutral colors for the more permanent surfaces (e.g., ceramic tiles, laminates, etc.) to facilitate future finish material changes.

4.33 Vinyl Composition Tile (VCT). Provide minimum Composition 2, Class 2 (through pattern) VCT, or provide sheet vinyl Type 1, Grade 1 or Type II, Grade 2 minimum with Class A (fibrous) backing. Avoid "no wax" surfaces, and white as a predominant color.

4.34 Carpet

a) Carpet should be branded yarn dyed, Type 6,6 hollow filament nylon with stain and soil protection permanent or chemically bonded to the fiber or branded 100 percent solution dyed, Type 6,6 or 6 hollow filament nylon with a published 10-year colorfast warranty and stain and soil protection. Carpet tiles are acceptable for common areas and for administration spaces.

b) Carpet should be commercial grade, bulk continuous 100 percent nylon filament, tufted, or woven, and a heavy wear classification. Acceptable textures include level loop, textured loop, or cut and loop pile (cut pile should not exceed one-half of the total surface). Carpet should be of a neutral color base with a small pattern or heathered appearance (flecked with various colors). Solid, very light or very dark colors are unacceptable.

c) Carpet face weight should be 26 ounces minimum; pile height .187 inch minimum; stitch rate 8.5 per inch minimum; and gauge 1/8 inch minimum (two-ply yarn).

d) Primary backing should be of synthetic woven polypropylene. Secondary backing should be a commercial performance graded integral cushion backing system in 12 foot or 6 foot widths. Integral cushion backing system should consist of a sealant base and polyurethane cushion or a closed-cell vinyl cushion, each with releasability characteristics, providing a moisture barrier. Integral urethane cushion backing system should have a minimum cushion thickness of 4/32 inch and a 20 pound per cubic foot backing density. Integral vinyl cushion backing system should have a thickness of .156 inch and a density of 18.5 pounds per cubic foot. Carpet with a primary and secondary backing should not contain latex filler.

Table 2
Interior Finishes Schedule
NAVY

INTERIOR FINISH SCHEDULE			
AREA/SPACE	FLOORS	WALLS	CEILING
Administration	Carpet	Gypsum Board, Optional Accent Vinyl	Acoustical tile
Lounge/Meeting/ Game Room	Carpet	Gypsum board, Optional Accent Vinyl, Sisal	Acoustical tile
Public Toilets	Ceramic Tile	Full Height Ceramic Tile	Gypsum board
Vending	Quarry Tile	Gypsum board	
Bulk Storage	Sealed Concrete	CMU	Paint, Optional Texture
Housekeeping	VCT	Gypsum board	Acoustical tile
Laundry	VCT	Paint Gypsum board or CMU	Paint Gypsum board
Public Corridors	Carpet	Gypsum board, Vinyl Wall Covering, Optional Accent Vinyl,	Acoustical tile
Bedrooms	Carpet	Gypsum board, Optional One Wall Accent Vinyl	Gypsum board
Service Areas	VCT	Gypsum board, Vinyl Wall Covering	Gypsum board
Apartment Toilets	Ceramic Tile	Ceramic Tile	Gypsum board
Bedroom Closets	Carpet	Gypsum board	Gypsum board
Entry Door swing Areas	VCT or Carpet	Paint, Optional One Wall Accent Vinyl	
Note: Accent walls with vinyl wall covering are encouraged options.			

Table 2 (Continued)
Interior Finish Schedule
MARINES

INTERIOR FINISH SCHEDULE			
AREA/SPACE	FLOORS	WALLS	CEILING
Administration	Carpet	Paint	Paint, Optional Texture
Lounge/Meeting/ Game Room	Carpet	Paint	Paint, Optional Texture
Public Toilets	Ceramic Tile	Full Height Ceramic Tile	Paint
Vending	VCT	Paint	Paint, Optional Texture
Bulk Storage	VCT	Paint	Paint, Optional Texture
Housekeeping	VCT	Paint	Paint
Laundry	VCT	Paint	Paint
Public Corridors	VCT	Paint	Paint, Optional Texture
Bedrooms	VCT	Paint	Paint, Optional Texture
Service Areas	VCT	Paint	Paint
Apartment Toilets	Ceramic Tile	Ceramic Tile	Paint
Bedroom Closets	VCT	Paint	Paint

e) Performance Requirements. Warrant that under normal use the carpet will not ravel at seams or edges for 15 years. Secondary backing adhesion should be guaranteed not to delaminate for a minimum of 15 years. Provide a wear guarantee of no more than 10 percent of face yarn loss for a minimum of 15 years when installed and maintained in accordance with manufacturer s procedures. A 20 pound tuft bind should be guaranteed for a minimum of 15 years for urethane cushion backed products and a 7 pound tuft bind should be guaranteed for 15 years for vinyl backed products. Carpet should not give static discharges in excess of 3.5 kilovolts when tested under the American Association of Textile Chemists and Colorists (AATCC) 134, Electrostatic Propensity of Carpets.

f) Test Requirements. Flame and smoke resistant standards. Provide carpet complying with ratings as indicated for the following tests:

(1) Flooring Radiant Panel Test - ASTM E 648, Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source, and/or NFPA 253, Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source - carpet should have a minimum critical radiant flux of 0.22 watt per square centimeter or be considered a minimum of Class 2 rating;

(2) Methenamine Tablet Test - DOC-FF-1-70 and/or ASTM D 2858, Thermal Conductivity of Electrical Grade Magnesium Oxide;

(3) Smoke Density Test - NFPA 258, Determining Smoke Generation of Solid Materials and/or ASTM E 662, Specific Optical Density of Smoke Generated by Solid Materials - 450 or less.

g) Fade resistance standards. Provide carpet complying with ratings for AATCC 16, Colorfastness to Light, light colorfastness test: for dark colors, a gray scale rating of 4 or better after 180 standard fading hours as compared to AATCC gray scale for evaluation of change in color.

h) Installation and maintenance should be in accordance with manufacturer's printed installation and maintenance instructions.

4.35 Ceramic Tile. Use slip resistant ceramic floor tiles in baths and toilets. Specify a mottled or shaded tile to hide discoloration from detergents, etc. Use ceramic wall tile from floor to ceiling around bathtubs and showers, and in toilet compartments. Other walls may receive wainscot-height tile.

4.36 Specialties. Provide specialties including but not limited to those listed below. Provide durable materials consistent with building design. Building signs and other items on the building exterior should meet the BEAP.

4.37 Ceiling Fans. Provide ceiling fans in renovation and new construction in accordance with Table 3. Employ types which allow adequate ceiling clearance, are wall switch controlled and without pull chains. Short blades are preferred. Units with lights should have separate controls. Consider optional ceiling fans with timer controls in multipurpose rooms, game rooms, and laundry facilities. For the Marines, ceiling fans are optional.

4.38 Cabinets and Millwork. Built-in cabinets should be well constructed with sturdy hardware and hardwood construction. No particle board is allowed. Recessed pulls are preferred. Finish should be able to withstand frequent cleaning and should coordinate with the other finish materials within the space. Neutral colors are recommended for cabinets and millwork to facilitate future color scheme changes. Hinges should comply with BHMA 101. Locks and latches should comply with BHMA 601, Bored and Preassembled Locks and Latches, Series 4000, Grade 2. Closers should comply with BHMA 301, Door Controls, Closers.

4.39 Toilet Accessories. Toilet accessories may be surface mounted or recessed, of non-corrodible metal or tile, and should have a toilet paper holder, soap dish, combination tumbler and toothbrush holder, bathrobe hooks, and towel bars. Provide a shower curtain rod. Specify rod at proper height for conventional shower curtains (72 inches by 72 inches). Installation of a timer-controlled infrared heat lamp for auxiliary heating in toilets with bathtub or shower is optional. A recessed type heat lamp is preferred over surface mount type.

4.40 Window Covering Considerations. Window coverings (blinds or heavy-duty drapery hardware) must be an integral part of the construction contract. Mini blinds, vertical blinds, draperies, or a combination are authorized. Consider solar conditions when selecting a window treatment. Arrange curtain hardware so drapes lap window openings to reduce light leakage. Window treatments should be flame resistant. Drapery pleats that

are either stack pleated, roll pleated, or accordion-type pleated are preferred instead of pinch pleated. Use double carriers similar to Kirsh "Ripple fold" attachment. Blackout linings are optional. Traverse rods should be of commercial quality. The drapery lining should hang independently from the finished drapery treatment.

4.41 Furniture. Furniture should be of matching style and finish. Furniture should be well constructed of solid hardwoods and veneers with plastic laminate top surfaces. Recessed pulls are preferred. Maximize storage capabilities. Public furnishings should be extremely sturdy. Lounge furniture should be constructed with solid wood or steel frames. Plastic laminate tops should be used on table surfaces. Maximize the use of individual lounge chairs and love seats instead of sofas. Table 3 lists suggested furniture, furnishings, and fixtures associated with each apartment module type, and associated core areas. This table is based on a conceptual bachelor housing of E1 personnel.

4.42 Artwork and Accessories. Provide artwork for public areas except public toilets, living units, and storage rooms. Design graphics and interior signage well, and coordinate with the architectural style and finish materials. Silk plants are recommended for public areas. Provide wall protection for recreational games such as dart boards and billiards. Provide bulletin boards in service areas and the main entry. Provide nameplate signage with removable inserts to identify each occupant. Interior signage and bulletin boards should be an integral part of the construction contract. Artwork is considered collateral equipment and will be included in the interior design option.

4.43 Signs. Provide a signage plan, legend, and details. Design directional signs as an integral part of an overall building and site system, to be furnished and installed under the construction contract. Economy, aesthetics, durability, flexibility, ease of installation and maintenance are important considerations of signage design. Design the system to inhibit vandalism but with flexibility to enable the addition or deletion of information. Select a mounting mechanism for the signs to permit the reuse of signs as the facility changes. Specify an easily read letter form such as Helvetica Medium. Indicate the design, location, and installation method in the plan, elevations, and specifications. Require the contractor, in the project specifications, to make a comprehensive submittal of the proposed signage system and to provide information necessary for acquiring new or replacement signs. The exterior signage system

must be respected both on and off the specific facility site. Any signage must also be harmonious in the landscape. Care must be taken to use signs only when necessary and to restrict the use of random styles, placement, and colors. Prepare a Signage Manual to instruct the activity in maintenance of the signage system and provide specialized equipment and materials necessary for same. Place emphasis on directional signage to immediately familiarize trainees with the room names and numbers. Wall-mounted signs extending into the corridor will indicate room identifications from a distance and greatly enhance efficient access to the appropriate rooms.

a) Entrance Sign. Entrance signs at roadway, walkway and/or building entry point may be necessary to introduce the facility to visitors including the handicapped. Position entrance signs for visibility. Entrance signs should clearly identify the building name, function, number, and organization, and should be consistent with the installation's overall signage system. Often, several building entry signs are required to identify those activities that may be reached via a specific entry point when a building has more than one primary entrance.

b) Building Identification Sign. Facility identification signs identify a building by name and number. Design identification signs as part of the overall signage system of an installation, using freestanding signs and/or wall mounted signs. Locate and size building identification signs for visibility from the main access street. Coordinate building numbers with the Public Works Office and according to fire service requirements, and position at standard locations on the building.

c) Building Directory. Locate a building directory where it is clearly visible to visitors as they enter the building. The building directory should consist of a permanent header panel with the name of the building or the major organization in the building, plus a directory section that lists each tenant. Provide a changeable letter board with changeable letters or message slots for the directory section. In large facilities, a building locator plan to identify building spaces, key activities, and personnel may be a necessary addition to the directory. Locate floor or building section directories to be clearly visible to pedestrians entering from elevators, stairs, or major corridors.

Table 3
Suggested Furniture, Furnishings, and Fixtures Schedule
for Bachelor Housing Spaces

FURNITURE; FURNISHINGS; EQUIPMENT
Administration Area/Reception Area <ul style="list-style-type: none"> • Reception desk or counter • Office desk • 3 chairs • file cabinet
Multipurpose Room <ul style="list-style-type: none"> • 10 chairs • sofa • coffee table • 2 end tables • 2 table lamps • 2 wall- hung pictures • 27 inch television • Ceiling fan (optional)
Game Room <ul style="list-style-type: none"> • Pool table and accessories • 2 wall-hung pictures • Ceiling fan (optional)
Vending Area <ul style="list-style-type: none"> • Vending machines (as appropriate) • Waste receptacle • Seating (as appropriate)
Laundry Facilities <ul style="list-style-type: none"> • Folding table • Ceiling fan (optional)
Mail Service <ul style="list-style-type: none"> • 1 USPS approved mailbox per person (Navy only)
Public Toilets <ul style="list-style-type: none"> • Waste receptacle
Bedroom/Sleeping Area <ul style="list-style-type: none"> • Bed platform with headboard (double size preferred) and under-bed storage compartment

Table 3 (Continued)
Suggested Furniture, Furnishings, and Fixtures Schedule
for the (1+1) Apartment Module (Figures 1, 2, or 3)

FURNITURE; FURNISHINGS; EQUIPMENT
Bedroom/Sleeping Area (Continued) <ul style="list-style-type: none"> • Recliner (zero-clearance type) or upholstered chair • Desk chair with upholstered seat • Night stand • Table lamp • Waste basket • Desk with overhead cabinets or shelves • Desk lamp or task lighting at desk • Dresser with 6 drawers (3/3) • Dressing mirror, wall mounted • Floor lamp • Ceiling fan
Bedroom Closet <ul style="list-style-type: none"> • 5 side shelves (coated wire type), short wall • Hanging rod and shelf, long wall
Service Area <ul style="list-style-type: none"> • Base cabinets • Eating bar (3 feet high) • Two high chairs • Microwave • Stainless steel sink • Under-counter refrigerator with freezer • Coffee maker • Above counter wall cabinets (with microwave space) • Trash receptacle • Paper towel dispenser • Ironing board, small wall mounted drop type
Bathroom (outfit for use by 2 persons) <ul style="list-style-type: none"> • Bathtub/shower combination with recessed soap dish; and integral grab bar at upper and lower levels • Base cabinet with lavatory and overhead valance light • Mirror above lavatory • Medicine cabinet • Waste basket

Table 3 (Continued)
Suggested Furniture, Furnishings, and Fixtures Schedule
for the (2+2) Apartment Module (Figures 4, 5, or 6)

FURNITURE; FURNISHINGS; EQUIPMENT
Bathroom (outfit for use by 2 persons) (Continued) <ul style="list-style-type: none"> • Soap tray • 2 Toothbrush/cup holders • 2 Robe hooks • Toilet tissue holder • 2 Towel racks
Bedroom Closet <ul style="list-style-type: none"> • 2 meter closets, 5 side shelves on the short wall, and hanging rod and shelf on the long wall • Smaller closets, e.g., renovations, provide 1 shelf minimum
Service Area <ul style="list-style-type: none"> • Microwave (Optional) • Refrigerator with separate freezer compartment • Base cabinet with lavatory and overhead valance light • Mirror over lavatory • Dressing mirror, wall mounted • Ironing board, small wall mounted drop type • Paper towel dispenser • Medicine cabinet • Waste basket • Soap Tray • 2 Towel racks • 2 robe hooks installed 1 per door service side • 2 Toothbrush/cup holders • Ironing board, small wall mounted drop type, optional
Bathroom (outfit for use by 4 persons) <ul style="list-style-type: none"> • Bathtub/shower combination with recessed soap dish; and grab bar at upper and lower levels is preferred • Shower (minimum) • Soap tray • 2 Robe hooks install 1 per door bathroom side • Toilet tissue holder • 2 Towel racks

Table 3 (Continued)
Suggested Furniture, Furnishings, and Fixtures Schedule
for the (2+0) Apartment Module (Figure 7)

FURNITURE; FURNISHINGS; EQUIPMENT
<p>Bedroom/Sleeping Area</p> <p>2 Beds, each with headboard (single) and under-bed storage compartment</p> <ul style="list-style-type: none"> • 2 Desk chairs with upholstered seats • 2 Night stands • 2 Table lamps • Wastebasket • 2 Desks with overhead cabinets or shelves • 2 Desk lamps or task lighting at each desk • Dresser with 6 drawers (3/3) • Wall mirror • Floor rug, area type with reasonable coverage, with pad • Ceiling fan (optional) • Ironing board, small wall mounted drop type (optional)
<p>Bedroom Closet</p> <ul style="list-style-type: none"> • 2 meter closets, 5 side shelves on the short wall, and hanging rod and shelf on the long wall • Smaller closets, e.g., renovations, provide 1 shelf minimum
<p>Service Area (Note: there are 2 service areas in 2+0 plan)</p> <ul style="list-style-type: none"> • Under-counter refrigerator with freezer compartment or Refrigerator with separate freezer compartment (may be located in the sleeping room) • Microwave (optional, locate on top of refrigerator) • Base cabinet with lavatory and overhead valance light • Mirror (located over the lavatory) • Dressing mirror, full length (located on 1 closet door) • Paper towel dispenser • Medicine cabinet (located in-wall, beside lavatory) • Wastebasket • Soap Tray • 2 Towel racks • 2 Toothbrush/cup holders
<p>Shower Compartment</p> <ul style="list-style-type: none"> • Shower with integral grab bar and soap tray; • Towel rack integral to the shower door

d) Directional Signs. Locate directional signs to indicate the location of high priority destinations, departments, and functions of a building at every decision point - opposite the elevators, opposite the stairways, and at each corridor intersection. Indicate route to major functional groupings.

e) Room Identification Signs. Room signs must identify room entrances and services such as toilets, telephones, housekeeping activities and stairs, in addition to apartment room signs.

f) Regulatory Signs. Regulatory signs prohibit certain activity, for example, "No Smoking" or "No Entry." Many safety signs are required by law or regulation and may include building evacuation, fire exit maps, or exit maps specifically for the handicapped.

g) Informational Signs. Additional signs may be required to list building and activity operating hours.

h) Notice/Bulletin Boards. These are especially important to control clutter and readily accommodate changing information throughout the building. Provide tack board surfaces or similar surface management systems to accommodate unanticipated messages, signs, posters, announcements, etc., at high traffic areas, doors, elevators, counters, columns, drinking fountains, public telephones, lounges, etc.

4.44 Closet Accessories. Provide living and bedroom closets with vinyl clad metal shelves and hanging systems. Use heavy-duty materials median braced for heavy loads. Also refer to par. 3.8.2.b) for closet electrical requirements.

4.45 Smart Building Systems. Apply smart building concepts using local loop technology. Avoid central controllers and monitors.

4.46 Elevators or Cargo Lifts

a) For two or three story buildings, provide a level concrete pad and removable sectional railings to accommodate the use of a temporary cargo lift for infrequent furniture movement.

b) For buildings four stories or higher, provide an elevator adequate for passengers or furniture.

4.47 Heating, Ventilating, and Air Conditioning (HVAC). HVAC should provide individual modules choice of heating and cooling year round with individual units to permit maintenance without overnight outages of either heating or cooling. The selection of the type of HVAC system used for a housing significantly impacts the initial construction cost and the life cycle cost of the facility. An existing HVAC system can be reused for renovation projects, but must provide individual heating and cooling of each apartment at any time. Existing heating or cooling systems can be reused, but must provide individual heating and cooling of each apartment at any time.

4.47.1 Controls. Provide an individual climate control in each apartment. Plan the location of individual HVAC units within each module to minimize utility runs to the units. Provide heating or cooling in any season without regard for operation of adjacent apartments.

4.47.2 Energy Efficient Design. Apply an integrated approach to the design of bachelor quarters that minimizes energy consumption and optimizes life cycle cost effective renewable energy possibilities. Use a practical combination of site selection and siting, energy conserving building envelope technologies, energy efficiency HVAC systems to achieve this goal. Incorporate renewable energy principles such as daylighting, passive and active solar, natural ventilation, and photovoltaics where they are life cycle cost effective. Follow the guidance in NAVFACENGCOM Design Energy Target Reductions, Interim Technical Guidance, dated 5 June 1995, to achieve energy conserving designs for bachelor housing.

4.48 Plumbing. Provide hot and cold water to public toilets, private bathrooms, kitchenettes, janitor closets, and laundry rooms. Provide shutoff valves at fixtures. Provide tank-type low water volume water closets in toilet rooms, of elongated or round, one-piece construction with a closed-front seat and a lid. Water closets and bath fixtures should match and should be neutral in color.

a) Provide hose bibs on exterior walls of each building at 100 foot intervals; frost-free as dictated by climatic conditions.

b) Provide floor drains in janitor closets and laundry rooms.

c) Provide a separate water heating system for laundry rooms.

d) Provide drinking fountain for public areas.

e) Plan plumbing systems for bachelor housing taking advantage of stacking bathrooms and placing fixtures back to back. Mechanical engineers, architects, and structural engineers should work together to carefully plan the size and location of plumbing chases with minimal impact on usable living space. Consider collocating plumbing chases with exhaust risers serving each room.

f) Small localized water heaters are preferred by the energy conservation designers. Avoid plumbing chases whenever possible by placing plumbing in wall cavities. For residential construction, the life cycle cost for a pipe chase exceeds the cost of not having one, most homes do not use pipe chases.

g) Use the following fixtures as standards:

(1) Washerless faucets at lavatories.

(2) Single lever faucets at tub showers if applicable.

(3) Showers to use terrazzo base with full height ceramic surround.

(4) Shutoff valves for each fixture.

(5) Tank type, water saver, single piece, elongated bowl water closets with closed front seat, and lid in private living units.

(6) In-line flow restricter at shower.

(7) Acid-resisting cast iron bathtubs with metal stopper. Arrange as tub and shower with full height surround.

h) For central heads provide the following plumbing facilities:

(1) Water closets: 1 per 10 persons

(2) Lavatories: 1 per 10 persons

- (3) Bathtubs: 1 per 8 persons
- (4) Showers: 1 per 8 persons
- (5) Water coolers: 1 per 100 persons
- (6) Service sinks: one floor or service area.

4.49 Electrical

a) Provide the following as required:

- (1) Distribution equipment
- (2) Wiring
- (3) Receptacles and grounding
- (4) Interior and exterior lighting
- (5) Emergency lighting
- (6) Telephone wiring
- (7) Fire detection and annunciation
- (8) Cable television wiring
- (9) Intrusion detection systems at the exterior

doors.

- (10) Ceiling fans, see Table 3 and par. 4.37.

b) Base electrical system design calculations on multi-family occupancy rather than interior corridor occupancy since the bachelor housing is the full-time home of the residents, and therefore has a higher demand factor.

c) Provide metering for electric power.

d) For direct entrance rooms, provide three-way switches at the entrance door and in the vanity area so that the living room and bedroom area lighting is controlled at either location. Also, provide motion sensor switches at bathroom doors to control the bathroom light fixture. Provide 20 ampere outlets throughout the apartment per applicable electrical code. In

bedrooms, provide 20 ampere dedicated quadraplex outlets combined with television and data outlets as described. Provide quadraplex and duplex outlets in the kitchenette area.

e) Provide each apartment with two dedicated lines for telephone, and data outlet. Dedicate each line solely to a bedroom, providing each bedroom with two combination outlets with duplex, telephone, and data outlet. Locate on opposite walls to facilitate and coordinate with the room furniture layout.

f) Ceiling fans should be provided in renovation and new construction in accordance with Table 3, and refer to par. 4.37.

g) Provide incandescent or fluorescent ambient lighting in each room. The use of fluorescent fixtures in living rooms/bedrooms is allowed, but should be carefully selected to fit into the residential environment. Fixtures in module rooms should not appear "institutional." Do not rely solely on table lamps for room lighting. Ambient light level at desk height should average 30 footcandles in each bedroom.

h) Conceal wiring; exposed surface metal raceways or conduits are not allowed.

i) Provide exterior lighting in parking areas, building entrances, and walkways. Refer to Section 2 for more information concerning exterior lighting. Use NFPA 70, National Electrical Code, the IES Lighting Handbook, and NFPA 101 for lighting calculations. Provide one exterior light fixture outside each room entrance door for exterior corridor and garden style housing.

j) Perform lightning protection risk assessment in accordance with NFPA 780, Lightning Protection Code.

4.49.1 Lighting. Provide lighting fixtures and lighting levels to support residential character, to ensure safety, and to control maintenance cost and energy use.

a) Use fluorescent lighting fixtures in bathrooms and kitchenettes of living units and public, administrative, and service spaces.

b) Provide incandescent or fluorescent ambient lighting in each room. Provide overhead lighting in bedrooms. Fluorescent fixtures in living rooms/bedrooms are allowed, but

should be recessed to fit into the residential environment. Can fixtures with residential character are also allowed. If the ceiling height will not allow for a combination light-fan fixture, position or balance the lighting to avoid creating a strobe light effect by the fan. Fixtures in module rooms should not appear "institutional." Do not rely solely on table lamps for room lighting. Ambient light level at desk height should average 30 footcandles in each bedroom.

c) Use a combination of ambient and task lighting in living units. The designer should be cognizant of lighting for both day and night situations.

d) Include motion sensor light switches in closets and for area lighting at occasionally used entrances.

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REFERENCES

NOTE: THE FOLLOWING REFERENCED DOCUMENTS FORM A PART OF THIS HANDBOOK TO THE EXTENT SPECIFIED HEREIN. USERS OF THIS HANDBOOK SHOULD REFER TO THE LATEST REVISIONS OF CITED DOCUMENTS UNLESS OTHERWISE DIRECTED.

FEDERAL STANDARDS, MILITARY HANDBOOKS, NAVFAC P-PUBLICATIONS, AND DESIGN MANUALS:

Unless otherwise indicated, copies are available from the Defense Printing Service Detachment Office (DPSDO), Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.

MILITARY HANDBOOKS

MIL-HDBK-1008C	Fire Protection for Facilities Engineering, Design, and Construction.
MIL-HDBK-1013/12	Evaluation and Selection Analysis of Security Glazing for Protection Against Ballistic, Bomb, and Forced Entry Tactics.
MIL-HDBK-1190	Facility Planning and Design Guide

FEDERAL STANDARDS

42 U.S.C. 4151-4157	Architectural Barriers Act of 1968.
29 U.S.C. 794	Rehabilitation Act of 1973, Section 504.
FED-STD-795	Uniform Federal Accessibility Standards (UFAS).
	Americans With Disabilities Act Accessibility Guidelines (ADAAG).

OTHER GOVERNMENT PUBLICATIONS

NAVFAC P-80	Facility Planning Factor Criteria for Navy and Marine Corps Shore Installations.
DOD 2000.12D	Protection of DOD Personnel and Resources Against Terrorist Acts.

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DOD 2000.12H	Protection of Personnel and Activities Against Acts of Terrorism and Political Turbulence.
DOD 4165.63-M	DOD Housing Management Manual.
OPNAV 5100.23	Navy Occupational Safety and Health (NAVOSH) Program Manual.
OPNAV 5530.14	Department of the Navy Physical Security and Loss Prevention.
OPNAV 11010.20	Facilities Projects Manual (for Navy projects).
OPNAV 11103.1	Policies and Procedures Governing Bachelor Housing.
MCO P11000.5	Facilities Projects Manual (for Marines projects).

(Unless otherwise indicated, copies are available from the Defense Printing Service Detachment Office (DPSDO), Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 402-R-93-XXX	EPA's Map of Radon Zones.
Federal Register 59 FR 13402	Model Standards and Techniques for Control of Radon in New Residential Buildings.

(Unless otherwise indicated, copies are available from the Environmental Protection Agency (EPA) Radon Information Center, . 1355 Beverly Road, Suite 216, McLean, VA 22101.

NAVFACENGCOM Design Energy Target
Reductions, Interim Technical Guidance

(Unless otherwise indicated, copies are available from the Naval Facilities Engineering Command (NAVFACENGCOM), Code 15C, 1510 Gilbert Street, Norfolk, VA 23511-2699.)

NON-GOVERNMENT PUBLICATIONS:

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 16 Colorfastness to Light.

AATCC 134 Electrostatic Propensity of Carpets.

(Unless otherwise indicated, copies are available from the American Association of Textile Chemists and Colorists (AATCC), 1 Davis Drive, P.O. Box 12215, Research Triangle Park, NC 27709.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2858 Thermal Conductivity of Electrical Grade Magnesium Oxide.

ASTM E 648 Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

ASTM E 662 Specific Optical Density of Smoke Generated by Solid Materials.

(Unless otherwise indicated, copies are available from the American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103-1187.)

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC. (BHMA)

BHMA 101 Butts and Hinges.

BHMA 301 Door Controls, Closers.

BHMA 601 Bored and Preassembled Locks and Latches.

(Unless otherwise indicated, copies are available from Builders Hardware Manufacturers Association, Inc. (BHMA), 355 Lexington Avenue, New York, NY 10007.)

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IES)

IES Lighting Handbook.

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(Unless otherwise indicated, copies are available from Illuminating Engineering Society of North America (IES), United Engineering Center, 345 E. 47th Street, New York, NY 10017.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13R	Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height.
NFPA 70	National Electrical Code.
NFPA 72	National Fire Alarm Code.
NFPA 101	Life Safety Code.
NFPA 253	Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
NFPA 258	Determining Smoke Generation of Solid Materials.
NFPA 780	Lightning Protection Code.

(Unless otherwise indicated, copies are available from National Fire Protection Association (NFPA), One Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.)

GLOSSARY

AATCC. American Association of Textile Chemists and Colorists

ACTDUTRA. Active duty training

ADAAG. Americans With Disability Act Accessibility Guidance

ACM. Asbestos containing material

A/E. Architect/engineer

ASTM. American Society for Testing and Materials

BEAP. Base Exterior Architectural Plan

BHMA. Builders Hardware Manufacturers Association, Inc.

CMC. Commandant of the Marine Corps

CMU. Concrete masonry unit

CNP. Comprehensive Neighborhood Plan

CONUS. Continental United States

DOD. Department of Defense

EFD. Engineering field division

EFA. Engineering field activity

FFE. Finished floor elevation

HQMC. Headquarters Marine Corps

HVAC. Heating, ventilating, and air conditioning

IES. Illuminating Engineering Society of North America

IFB. Invitation for bid

IIC. Impact insulation class

MCO. Marine Corps Order

MOS. Military occupational specialty

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NAVFACENGCOM. Naval Facilities Engineering Command

NEXCOM. Naval Exchange Command

NFPA. National Fire Protection Association

OCONUS. Outside the Continental United States

O&M. Operation and maintenance

OSD. Office of the Secretary of Defense

PCE. Parametric cost estimating and programming

PEP. Parametric estimating and programming

RFP. Request for proposal

STC. Sound transmission class

TDY. Temporary duty

UFAS. Uniform Federal Accessibility Standards

VCT. Vinyl composition tile

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